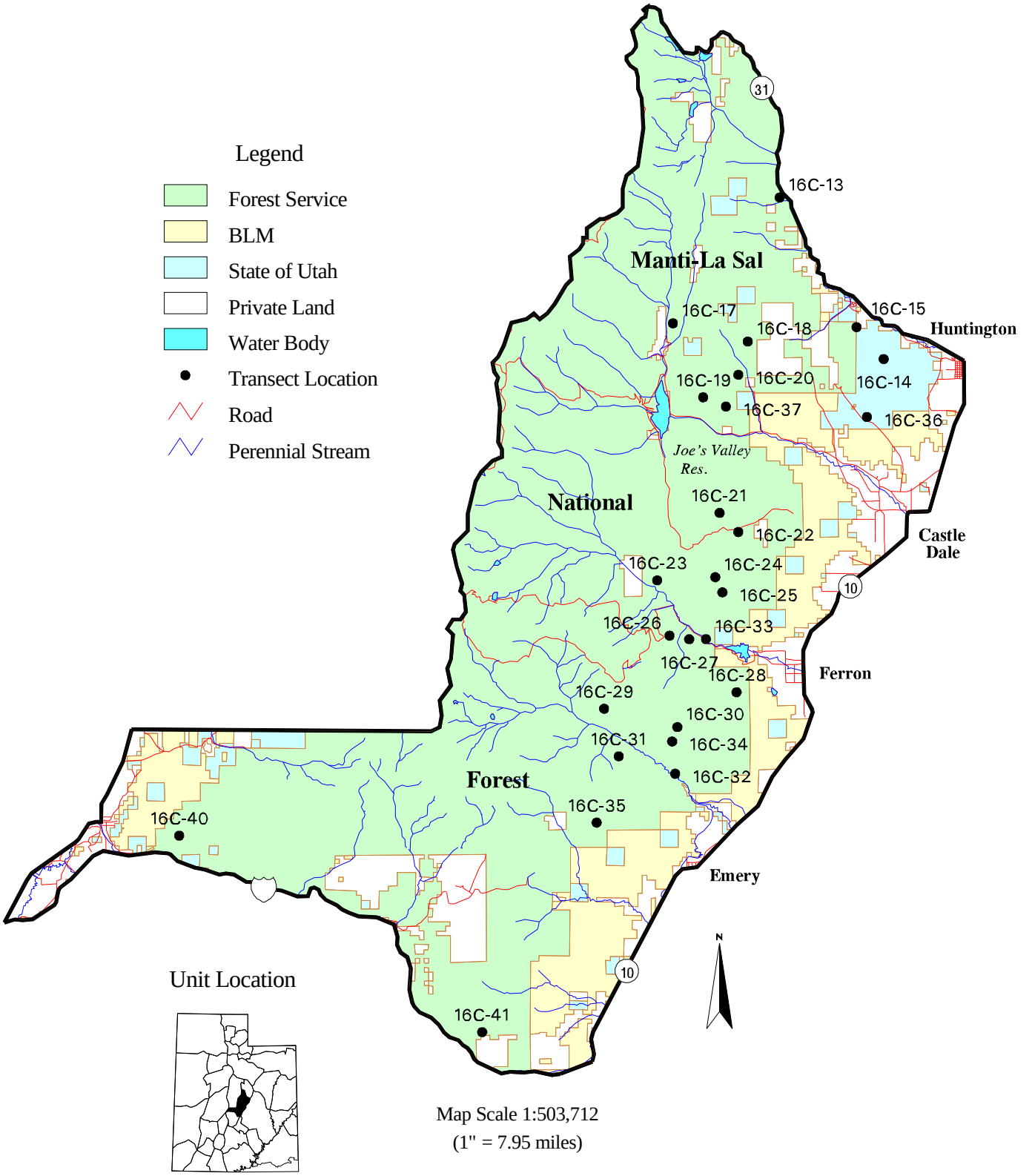
Management Unit 16C



Map Scale 1:503,712
(1" = 7.95 miles)

WILDLIFE MANAGEMENT UNIT 16C (31) - SOUTH-EAST MANTI

Boundary Description

> **Sanpete, Emery and Sevier counties** - Boundary begins at the junction of Highway SR-10 and Highway SR-31 at Huntington; then south on SR-10 to Interstate 70; west on I-70 to Highway US-89 at Salina; north on US-89 to SR-31 at Fairview; southeast on SR-31 to SR-10 at Huntington.

Herd Unit Description

Unit 16C was previously called Deer Herd Unit 31- South East Manti. It was enlarged in the spring of 1998 to include both the east and west sides of the Wasatch Plateau and renamed Wildlife Management Unit 16C. Unit 16C is a subunit of the very large management unit 16 which encompasses areas in Utah, Carbon, Juab, Sevier, and Sanpete Counties. Approximately 54% of unit 16's winter range is on land administered by the U.S. Forest Service and the BLM. Another 35% is on private land. The U.S. Forest Service administers 72% of the summer range, while 22% is private.

The upper limits of the winter range on subunit 16C - South-East Manti, generally follow the rim of the plateau and the 9,000 foot level of the south and west exposures of the large canyons and mountain slopes. A good description of winter range limits and prominent vegetative types can be found in the 1980 Utah Big Game Range Inventory (Giunta l982).

The upper portions of the winter range on Forest Service lands are managed primarily for livestock grazing. Widespread watershed rehabilitation, contour trenching and seeding, was done on this rangeland in the 1960's. An extensive road system provides access to a large percentage of the winter range. Many roads in critical areas are open or maintained and used winter long in relation to various activities, namely mining, gas wells, the Horn Mountain TV towers, and for recreation. Access is more restricted further south in the Ferron and Muddy Creek drainages.

The lowest foothill ranges are accessible year-round, and are usually adjacent to agricultural areas. Coal mining and the power plants are the major economic activities in the area. Other associated impacts include road improvements, truck traffic, and an increased human population. This all assuredly has an effect on the distribution and abundance of big game animals. Outdoor recreation is popular in the area. These activities include camping, hunting, fishing, four-wheeling, and snowmobiling which are facilitated by the extensive road system in the mountains and foothills. The very lowest portion of the herd unit supports a low desert shrub type on unproductive shale hills. This acreage is not considered part of the winter range.

Key Areas

The key deer wintering areas are the lower end of Muddy Creek and Ferron Creek, Black Dragon, Biddlecome Hollow, Cottonwood Canyon, and Huntington Canyon. Elk winter higher on Trail Mountain, North and South Horn Mountain, and Sage Flat. Deer also utilize these areas during mild winters. Elk utilize the mahogany and sagebrush on the lower points of the plateau, such as North and South Horn Mountain and Trail Mountain.

On the Southeast Manti Unit, much of the key winter range is on Forest Service lands. Pinyon-juniper benches become more limited to the south and there are mostly low desert shrub foothills associated with Muddy Creek. Overall, the pinyon-juniper type occupies a fair amount of the winter range at low elevations, but is not critical to the trend monitoring program. However, the chained and seeded portions of this type provide important wintering areas where many are monitored for trend. Chainings are sampled in the foothills from Huntington Canyon to south of Dry Wash. Other key areas at Middle Mountain and Dry Mountain are also sampled. The big sagebrush/grass range type is found on many key areas, especially on the

North East Manti Unit, but also on high elevation elk winter range on Trail, East, and Horn Mountains. Big sagebrush/grass is limited on critical deer winter range, but key areas are found on Black Dragon and Muddy Creek. Large areas of key winter range, also identified by the U.S. Forest Service in their Land and Resource Management Plan, are found on Trail Mountain, North Horn and South Horn Mountain, in lower Dry Wash, and along Muddy Creek. Mixed mountain brush and curlleaf mountain mahogany types are especially important in these areas.

Grazing Summary

The livestock grazing programs on Forest Service lands in the Southeast Manti Unit generally involve a deferred or rest-rotation system for cattle, or sheep grazing during the summer and fall. Specific allotment management plans vary as to exact season dates. Several study sites receive little impact from livestock due to accessibility, livestock distribution and management. The study site on Middle Mountain (#17), the only trend study on a sheep allotment, apparently receives little livestock use because the sheep are not grazed on the west side due to closure of the area after the chaining. Although contained in the Gentry Mountain cattle allotment, West Huntington Canyon (#13) above Crandall Canyon is not used by cows due to the long steep slopes up to the ridge top. The trend study on East Mountain (#18) is in the East Mountain Allotment which is made up of both private and USFS land. It is permitted for grazing June 21 to September 10 by 526 cattle in a four pasture rest rotation system. There are two studies in the Trail Mountain Cattle allotment. The area around the Trail Mountain Exclosure (#19) has been closed to grazing since the late 1960's after a watershed treatment. However, there is some trespass. The site at Miles Point (#20) is grazed from June 21 to September 20 by 901 cows under a deferred-rotation system.

There are five studies in the Horn Mountain cattle allotment (#21, #22, #23, #24, #25). The season of use on this allotment is June 6 to September 30, with 849 cows (4,371 AUM's) under a five pasture rest-rotation grazing system. All study sites are used by cattle. In the Black Dragon (#23) area, also in the Horn Mountain allotment, part of the herd is grazed for a short period early in the season. There is little grazing pressure in the sagebrush flat where the trend study is located because of the distance to water.

Water also limits cattle use on three study sites in the Ferron cattle allotment. The Dry Mountain (#26) and the isolated bench south of Dry Wash show little sign of use by cattle. Cattle grazing was limited on the isolated Birch Creek chaining (#27) in 1988 and 1994, but was moderate to heavy in 1999. The allotment is permitted for 1,607 cows, from June 21 to October 5. The plan follows a rest-rotation schedule utilizing eight pastures. The two other trend studies on the Ferron grazing allotment, Scab Hollow (#29) and Upper Hole Trail (#30), receive considerably more use by cows. Cattle trail up and down the old Hole Trail, but they should not holdover in the basin at the top of the trail where the study is located because there is no water. Cattle use to trail up Muddy Creek (#32), however there is not much livestock use on Forest Service land in the canyon anymore, except for some trespass from private land downstream. The new sites at Little Nelson Mountain (#33) and South Sage Flat (#34) also occur in the Ferron allotment.

The Emery cattle allotment is permitted for 6,402 AUM's, 1,387 cows from June 16 to September 30 in a six pasture rest rotation schedule. The area around Box Canyon Knolls (#31) is generally an early unit in the rest-rotation schedule.

The grazing programs for the BLM lands sampled on this unit are contained in the West Huntington and Wilberg Allotment Management Plans. Historically, there has been heavy cattle use on the West Huntington allotment. The deferred rotation system planned in 1968 was never implemented. A new plan was initiated in 1988, calling for closure of one pasture and a 50% reduction in spring AUM'S instead of the recommended elimination of all spring grazing permits. Currently, 177 cows use the unit from May 1 to June 26 and 140 cows from November 1 to December 15. Monitoring will continue, and there is a possibility of more reductions if there is no improvement in range conditions. The Wilberg allotment is also a cattle allotment, grazed in spring and late fall. Eighty-nine cows use the unit from November 1 to December 15 and April 16

to June 15. Fencing and water developments planned in 1969 were never completed so the two pastures are grazed on a continuous basis, one in winter and one in spring.

Herd Unit Management Objectives

There are no current specific management objectives for sub unit 16C, only unit wide objectives. The current target winter herd size for all of unit 16 is to achieve a target population size of 60,600 (38,000 wintering deer on the Wasatch Plateau or Manti Mountain Portion of the unit and 22,600 on the Nebo portion). A post season buck to doe ration of 15:100 is sought with 30% of these bucks being 3 point or better.

Trend Study Site Description

Unit 16C contains 26 trend study sites. Twenty sites were originally established in 1988 and reread in 1994 and 1999. In the summer of 1994, it was determined at an Interagency meeting of DWR, Forest Service, and BLM personnel that five new key area studies were necessary. The new studies were established in July and August of 1994 and include; Little Nelson Mountain #33 (sagebrush/grass), South Sage Flat #34 (sagebrush/grass), Wildcat Knolls #35 (black sagebrush/grass), Danish Bench #36 (chaining), and Joe's Valley Overlook #37 (mixed mountain brush). The study at Danish Bench, was established to replace Church Mine Road #16, which was eliminated due to light utilization. Two trend studies, Cedar Mountain #40 and Trough Hollow #41, were originally in other herd units but are now part of the Manti-Nebo Manti South unit. These two studies were established in 1985 and reread in 1991 and 1999.

Trend Study 16C-13-99

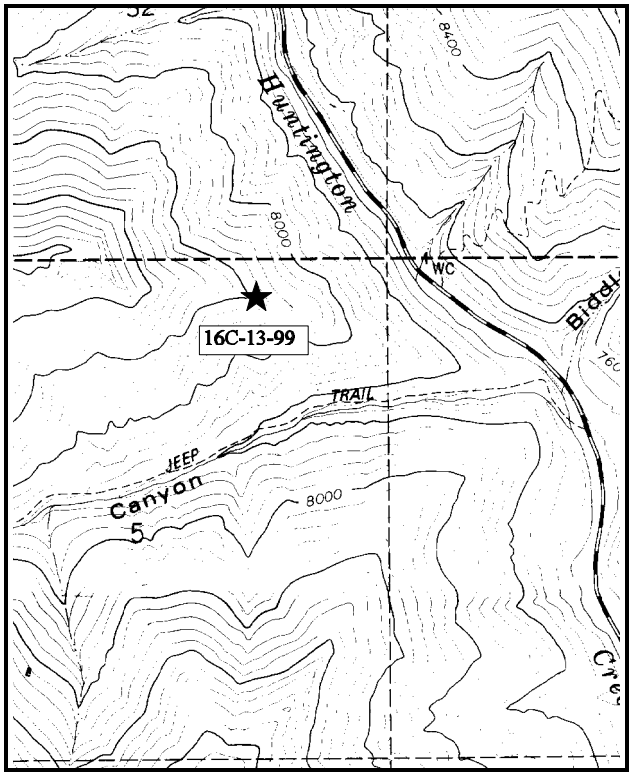
Study site name: West Huntington Canyon . Range type: Curlleaf Mountain Mahogany .

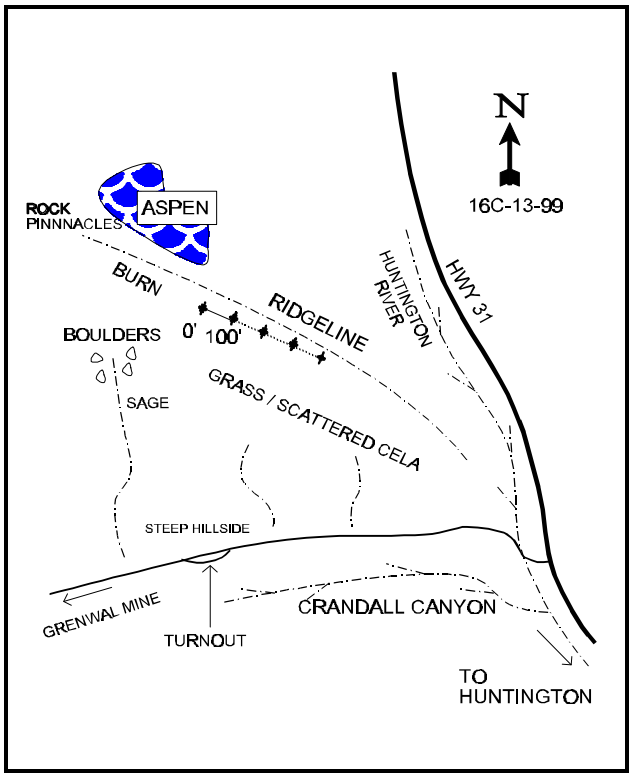
Compass bearing: frequency baseline 117°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Highway 31, the Huntington Canyon road, turn onto the Crandall Canyon road. Go up the canyon 0.7 miles to a turnout. From the turnout, look up the ridge to the north. The study site is on the top of the ridge on the eastern edge of an old burn; now sagebrush/grass and scattered mahogany. The site can be reached by a 1/4 mile hike up the steep rocky face, or a 3/4 mile hike up the ridge starting by the Huntington River. Once the top of the ridge below the rock pinnacles is reached, the study stakes are not difficult to locate. The 0-foot baseline stake is marked by browse tag #902S.





Map Name: Rilda Canyon Diagrammatic Sketch

Township 16S , Range 7E , Section 5 UTM 4368314.158 N, 486551.276 E

DISCUSSION

Trend Study No. 16C-13 (31-11)

The West Huntington Canyon trend study is located on the west side of Huntington Canyon along the top of the ridge, north of Crandall Canyon. The south-facing slopes and ridge tops in this area are used by elk in the winter. Clumps of aspen also provide summer deer habitat. This area does not appear to be used by livestock, probably due to its inaccessibility and lack of water. Pellet group data from 1999 estimate 10 deer and 96 elk days use/acre (25 ddu/ha, 237 edu/ha). All pellet groups appear to be from the previous winter. The study is within a curlleaf mountain mahogany type that burned many years ago. Along with the sparse mahogany over story, there is an understory of bluebunch wheatgrass, Salina wildrye, Oregon grape, and mountain big sagebrush.

The study is on the south side of the ridge, just below the ridge top with a southeast aspect. The elevation is 8,400 feet. The slope is very steep (45%) and rocky. Cliffs are formed by exposure of the underlying sandstone. The rocky nature of the site allows for generally shallow soils, but there are deep spots between rocks which provide good rooting sites for trees. Effective rooting depth is actually moderately deep and is estimated at just over 16 inches. The texture is a clay with a slightly alkaline pH (7.4). Phosphorus is limited at only 5.5 ppm where values less than 10 ppm can limit normal plant growth and development. In spite of severe pedestalling and exposed roots, the large bluebunch wheatgrass and Salina Wildrye play a major role in holding the soil in place. For the most part, the soil is moderately protected. Erosion is inevitable due to the steepness of the slope, but it does not appear to be excessive.

The dominant overstory on the site consists of a few scattered mature curlleaf mountain mahogany, some of which are mostly unavailable due to height and highlining. Smaller, more available mahogany sampled on the site were heavily browsed in 1999. Mountain big sagebrush, the key browse species, provides more than half of the browse cover. It had a density of 3,466 plants/acre in 1988, 1,520 in 1994, and 1,760 by 1999. Due to the apparent lack of dead plants in 1994 and 1999, the large decrease in population density between 1988 and 1994 is the result of the much larger sample size used in 1994. The study site baseline was lengthened in 1994 which more than tripled the original sample size for browse. Sagebrush was mostly lightly utilized in 1988 and 1994, with more moderate use in 1999. The population is healthy with good vigor and low decadence.

Snowberry, low rabbitbrush, pinyon, and Rocky Mountain juniper are present on the mountainside but in low numbers. The most numerous browse is Oregon grape, which provided 33% of the browse cover in 1994 and 29% in 1999. Although no signs of a hedged growth form can be found on these small shrubs, elk have been known to utilize this species as part of their winter diet.

Salina wildrye is the most abundant grass followed by bluebunch wheatgrass. It appears that there was an identification problem between bluebunch wheatgrass and Salina wildrye in 1994. Currently (‘99) Salina wildrye provides 87% of the grass cover and 49% of the total vegetation cover. Bluebunch wheatgrass provides an additional 13% of the grass cover. There is also a small amount of Carex. Forbs are rare and only aster is common. The aster currently (‘99) provides 63% of the limited forb cover.

1994 TREND ASSESSMENT

Ground cover characteristics have changed somewhat since 1988. Percent litter cover has declined considerably due to drought conditions and percent bare ground has increased. However, the herbaceous understory is abundant and adequately protects the soil from erosion indicating a stable soil trend for the time being. The browse trend is stable for the key browse species, mountain big sagebrush, but down for seedlings, and young. Percent decadency rates are low. Overall, trend for browse is slightly down. Trend for herbaceous understory is stable with improvements in species composition. Nested frequency of grasses declined slightly, while nested frequency of forbs increased.

TREND ASSESSMENT
soil - stable
browse - slightly down due to declining biotic and reproductive potentials of sagebrush
herbaceous understory - stable

1999 TREND ASSESSMENT

Trend for soil continues to be stable. Percent litter cover remains similar to 1994 estimates, but percent bare ground has declined. There is some enviable erosion occurring due to the steep slope. Pedestaling and terracing are evident, however the abundant herbaceous cover helps stabilize the soil. Trend for browse is stable. The key species, mountain big sagebrush has a relatively stable density of 1,760 plants/acre. Vigor is good, percent decadence is low, and use is light to moderate. The preferred curlleaf mountain mahogany occurs in low densities. It is moderately to heavily hedged where available. Trend for the herbaceous understory is stable. The dominate species is Salina wildrye which provides 87% of the grass cover, 74% of the herbaceous cover or 49% of the total vegetation cover. It appears that much of this grass was misidentified as bluebunch wheatgrass in 1994. Forbs are limited, yet they have increased slightly in nested frequency since 1994. Aster is the only abundant forb.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable but dominated by Salina wildrye

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 13

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	$_{a}$40	$_{b}$194	$_{a}$68	18	68	29	10.87	2.84
G	Carex spp.	$_{b}$15	$_{a}$5	$_{a}$5	10	2	2	.03	.06
G	Elymus salina	$_{c}$279	$_{a}$80	$_{b}$229	91	33	79	3.08	19.46
G	Koeleria cristata	-	-	2	-	-	1	-	.00
G	Poa pratensis	-	-	1	-	-	1	-	.06
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		334	279	305	119	103	112	13.98	22.43
Total for Grasses		334	279	305	119	103	112	13.98	22.43
F	Achillea millefolium	$_{a}$-	$_{a}$2	$_{b}$9	-	1	4	.03	.23
F	Antennaria microphylla	-	3	-	-	1	-	.03	-
F	Artemisia ludoviciana	$_{a}$-	$_{ab}$3	$_{b}$6	-	1	5	.15	.07
F	Aster chilensis	$_{a}$19	$_{b}$44	$_{a}$4	7	16	2	.76	.06
F	Astragalus convallarius	$_{a}$2	$_{ab}$12	$_{b}$19	1	5	9	.07	.88
F	Aster spp.	$_{a}$20	$_{a}$32	$_{b}$69	9	13	24	.26	2.43
F	Astragalus spp.	-	4	-	-	2	-	.18	-
F	Chenopodium album (a)	-	2	-	-	1	-	.00	-
F	Chaenactis douglasii	-	4	-	-	2	-	.01	-

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Cirsium spp.	-	1	-	-	1	-	.03	.00
F	Hymenoxys richardsonii	1	-	-	1	-	-	-	-
F	Ipomopsis aggregata	-	-	1	-	-	1	-	.00
F	Machaeranthera canescens	4	5	11	2	3	5	.22	.13
F	Phlox longifolia	$_{a}$-	$_{ab}$6	$_{b}$11	-	2	5	.01	.02
F	Sanguisorba minor	-	-	-	-	-	-	-	.00
F	Schoencrambe linifolia	-	3	-	-	1	-	.00	-
F	Taraxacum officinale	1	-	-	1	-	-	-	-
Total for Annual Forbs		0	2	0	0	1	0	0.00	0
Total for Perennial Forbs		47	119	130	21	48	55	1.77	3.86
Total for Forbs		47	121	130	21	49	55	1.78	3.86

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 13

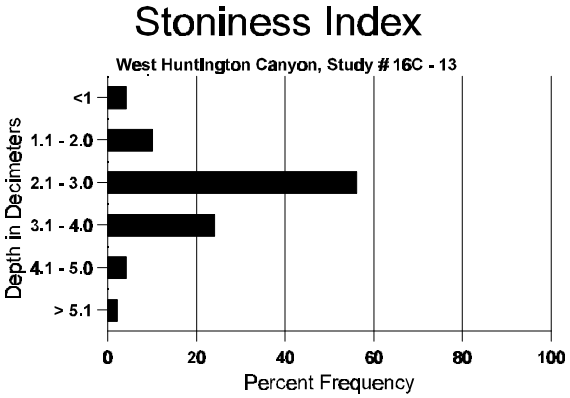
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Artemisia tridentata vaseyana	44	49	4.25	8.53
B	Cercocarpus ledifolius	7	5	.15	.00
B	Chrysothamnus nauseosus	0	0	-	-
B	Chrysothamnus viscidiflorus	1	4	.00	.30
B	Gutierrezia sarothrae	0	2	-	.03
B	Juniperus osteosperma	-	-	.63	-
B	Mahonia repens	65	60	2.47	3.85
B	Pachistima myrsinites	1	2	-	.09
B	Sambucus cerulea	0	2	-	-
B	Symphoricarpos oreophilus	6	5	.06	.53
Total for Browse		124	129	7.58	13.34

BASIC COVER --
Herd unit 16C, Study no: 13

Cover Type	Nested Frequency '94	'99	Average Cover % '88	'94	'99
Vegetation	300	316	10.25	24.57	40.22
Rock	285	189	10.00	9.04	10.68
Pavement	227	247	1.25	1.21	5.88
Litter	382	360	53.00	32.40	33.01
Cryptogams	8	1	0	.04	.00
Bare Ground	311	298	25.50	30.77	25.76

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 13, Study Name: West Huntington Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.3	54.6 (16.3)	7.4	23.3	32.2	44.6	3.2	5.5	99.2	0.7



PELLET GROUP DATA --
Herd unit 16C, Study no: 13

Type	Quadrat Frequency '94	Quadrat Frequency '99
Rabbit	13	7
Elk	47	54
Deer	4	6

Pellet Transect Days Use/Acre (ha) '99
n/a
96 (237)
10 (24)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 13

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	22	-	-	-	-	-	2	-	-	24	-	-	-	1600			24
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	28	1	-	1	-	-	-	-	-	29	-	1	-	2000			30
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	88	19	-	-	-	-	-	-	-	-	18	-	1	-	1266	13	21	19
	94	50	9	1	-	-	-	-	-	-	60	-	-	-	1200	20	32	60
	99	32	29	7	1	-	-	-	-	-	69	-	-	-	1380	16	24	69
D	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	5	5	-	-	-	-	-	-	-	3	-	-	7	200			10
	99	3	5	-	-	-	-	-	-	-	7	-	-	1	160			8
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	02%	00%	04%	-56%
'94	18%	01%	09%	+14%
'99	39%	08%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	3466	Dec:		6%
'94	1520			13%
'99	1760			9%

Cercocarpus ledifolius																		
Y	88	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	99	1	-	-	-	-	2	-	-	-	3	-	-	-	60			3
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	-	-	1	-	-	-	-	-	4	-	-	-	80	27	18	4
	99	-	-	-	-	3	1	-	-	-	4	-	-	-	80	15	14	4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	100%	00%	00%	+75%
'94	00%	00%	00%	-46%
'99	43%	43%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	66	Dec:		-
'94	260			-
'99	140			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	15	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	29	53	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

Chrysothamnus viscidiflorus																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	10	10	1
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	10	15	1
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	9	14	6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-85%
'94	00%	00%	00%	+83%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	132	Dec:	-
	'94	20		-
	'99	120		-

Gutierrezia sarothrae																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	8	12	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	80		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
S	88	163	-	-	-	-	-	27	-	-	190	-	-	-	12666			190
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
Y	88	143	-	-	-	-	-	-	-	-	143	-	-	-	9533			143
	94	56	-	-	-	-	-	-	-	-	56	-	-	-	1120			56
	99	297	2	-	-	-	-	-	-	-	299	-	-	-	5980			299
M	88	489	-	-	-	-	-	20	-	-	509	-	-	-	33933	5	4	509
	94	777	-	-	4	-	-	-	-	-	781	-	-	-	15620	9	12	781
	99	644	-	-	28	-	-	-	-	-	672	-	-	-	13440	4	5	672

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-61%
'94	00%	00%	00%	+14%
'99	.20%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	43466	Dec:	-
	'94	16740		-
	'99	19420		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pachistima myrsinites																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	2	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	9	0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+67%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sambucus cerulea																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	40	52	0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	57	68	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	240		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
Y	88	-	-	-	3	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160	11	26	8
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100	14	26	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-20%
'94	00%	00%	00%	-38%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	200	Dec:	-
	'94	160		-
	'99	100		-

Trend Study 16C-14-99

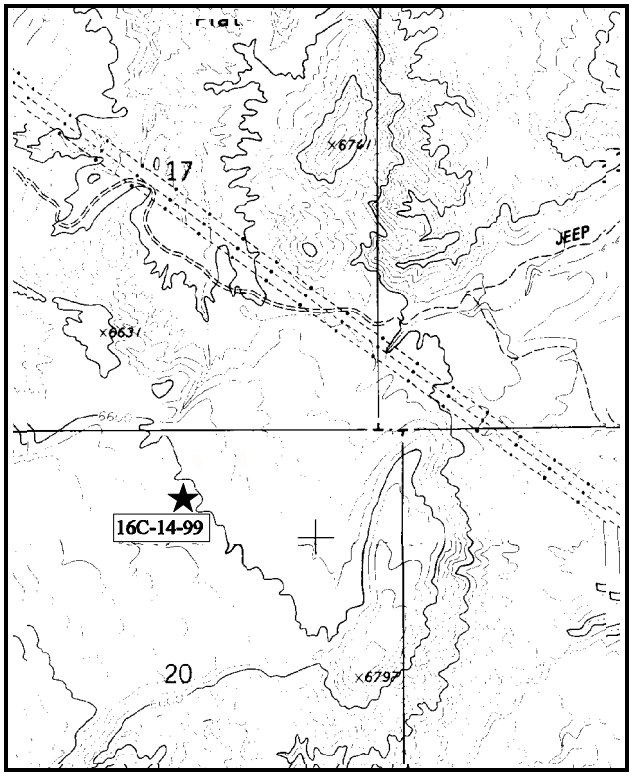
Study site name: Red Point . Range type: Chained, Seeded P-J .

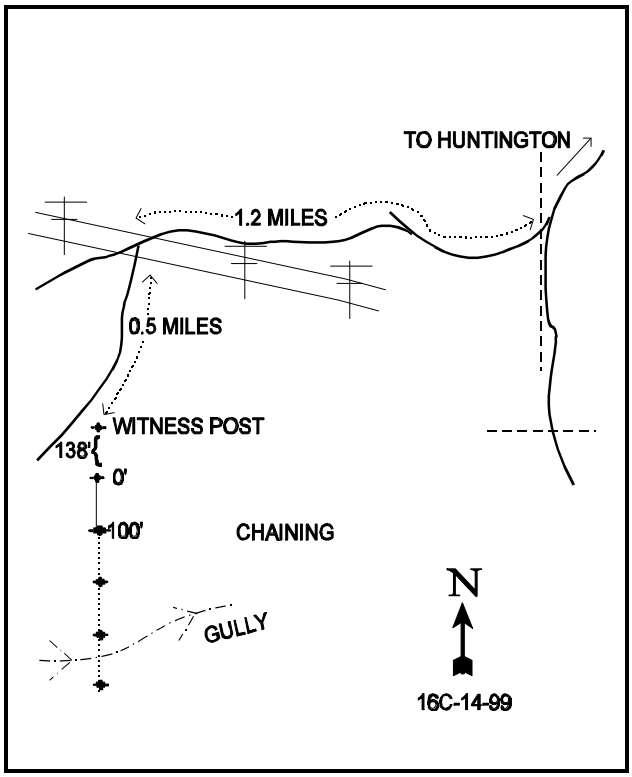
Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Main Street in Huntington, go west on 400 North. Pass the old mill on the edge of town, cross the canal and continue 0.75 miles. Turn left off the old Huntington River road at a major fork. Proceed 1.55 miles, turn right, and go through a gate. Continue straight 0.2 miles to another fork and stay left for 1 mile. From here, stay straight for an additional 0.2 miles to a two-way fork. Turn left and go 0.5 miles to a witness post on the left side of the road in the chaining. The frequency baseline start 138 feet south of the witness post. The 18" tall fencepost marking the 0-foot baseline has browse tag #9012 attached.





Map Name: Red Point

Diagrammatic Sketch

Township 17S , Range 8E , Section 20

UTM 4353803.603 N, 495895.797 E

DISCUSSION

Trend Study No. 16C-14 (31-12)

The Red Point study is located in a chaining at the base of East Mountain, below the prominent Red Point. The 300 acre bench was chained and seeded in 1973. The large bench where the study is located slopes gradually (8-9%) with a northeast aspect. The elevation is 6,400 feet. The fractured sandstone bedrock allows true mountain mahogany and green ephedra to become well established on an otherwise shallow soil.

Overall declining trends and poor range condition observed in the West Huntington allotment led the BLM to recommend changes in grazing, eventually resulting in a 50% reduction in spring AUM'S and closure of one pasture. As part of the Huntington Canyon winter range, deer and elk utilize the area in winter. Pellet group data from 1999 estimate 25 deer, 55 elk, and 4 cow days use/acre (62 ddu/ha, 136 edu/ha, 10 cdu/ha). All cow sign appeared to be from last season. Some of the deer pellet groups were fresh and about 12 deer were observed near the site in 1999. All elk pellet groups appeared to be from winter use. Rabbits are common and several Cottontailes were seen.

Soil at the site is relatively deep with the effective rooting depth estimated at 16 inches. Soil texture is a loam with a slightly alkaline pH (7.6). Phosphorus is low at 4.1 ppm. Values below 10 ppm may limit normal plant growth and development. There are large numbers of boulders, smaller rocks, and pavement on the surface. These rocks are mostly sandstone and many have white calcite deposits. Rock and pavement currently ('99) produce 27% cover, while litter cover is estimated at 35%. Most of the litter consists of large debris from the chaining. Soil pedestaling and localized surface water movement is evident, but erosion is minimal due to the excessively well-drained nature of the soil, although there is evidence of erosion during high intensity summer storms.

An even-aged stand of surviving pinyon and juniper have regrown on the chained bench. Point-center quarter data from 1994 estimated 198 trees/acre, with 55% being pinyon and 45% being juniper. In 1999, mature pinyon and juniper trees averaged 10 to 12 feet in height. They provide 42% of the browse cover and overhead canopy cover averages 4%. Point quarter data from 1999 estimate 141 pinyon and 99 juniper trees/acre. Average diameter of pinyon is 2.5 inches while juniper averages 1.8 inches.

Green ephedra, slenderbush eriogonum, true mountain mahogany, and antelope bitterbrush provide the bulk of the winter forage on this site. None of these species are very abundant however. Both green ephedra and slenderbush eriogonum showed very light hedging in 1994, and moderate to heavy use in 1999. True mountain mahogany displays consistent moderate to heavy browsing since 1988. Yucca is very common with no utilization evident. The yuccas stiff, sharp leaves also protect the closely associated grasses from use.

The herbaceous understory is poor. Grasses produced only 10% cover in 1994 and 12% in 1999. The predominant grass is crested wheatgrass which currently ('99) provides 95% of the grass cover. A few other species are present but occur rarely. Forbs are uncommon and provide very little cover or forage. Nearly all herbaceous species have steadily declined in nested frequency since 1988.

1994 TREND ASSESSMENT

Ground cover characteristics have improved on the site since 1988. Percent bare ground has declined considerably while litter cover has increased. The only negative aspect of the soil trend is the decline in nested frequency of the herbaceous understory. Trend for soil is considered slightly up. Browse are not very abundant on the site but the trend is stable. Changes in density of true mountain mahogany and slenderbush eriogonum are mostly due to the greatly increased sample size used in 1994. Trend for the herbaceous understory is slightly down due to a decline in sum nested frequency of grasses and forbs. However, the dominant grass, crested wheatgrass, did not decline significantly.

TREND ASSESSMENT
soil - slightly up
browse - stable
herbaceous understory - slightly down

1999 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground has remained similar to 1994 estimates, but litter cover declined and percent cover of rock and pavement increased. Some localized erosion is occurring, however it is not a serious problem due to the gentle terrain. Trend for browse is stable. Densities for the key species, true mountain mahogany and green ephedra, are stable and vigor is normal. Utilization of mahogany has remained moderate to heavy, while ephedra, dwarf rabbitbrush, and bitterbrush display heavier use compared to 1994. Trend for the herbaceous understory is stable yet poor. Sum of nested frequency of grasses has increased slightly, with nested frequency of forbs has declined slightly. Crested wheatgrass dominates the herbaceous understory by providing 91% of the herbaceous cover. It has increased slightly in nested frequency since 1994, but not significantly. Forbs are rare and have steadily declined in frequency since 1988. Overall, grasses and forbs provide only about 12% cover.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable but poor

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 14

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron cristatum	270	265	284	91	88	94	8.66	11.28
G	Agropyron intermedium	$_{b}$50	$_{a}$1	$_{a}$-	22	1	-	.00	-
G	Elymus junceus	$_{a}$2	$_{b}$16	$_{ab}$9	1	7	4	.35	.25
G	Oryzopsis hymenoides	24	25	20	12	14	7	.52	.37
G	Sitanion hystrix	$_{b}$45	$_{a}$1	$_{a}$-	22	1	-	.00	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		391	308	313	148	111	105	9.54	11.91
Total for Grasses		391	308	313	148	111	105	9.54	11.91
F	Arabis perennans	-	2	5	-	1	2	.00	.01
F	Caulanthus crassicaulis	-	1	-	-	1	-	.00	-
F	Chenopodium album (a)	-	1	-	-	1	-	.01	-
F	Cryptantha spp.	$_{c}$74	$_{b}$45	$_{a}$17	33	21	8	.65	.35
F	Descurainia pinnata (a)	-	10	3	-	4	1	.02	.00
F	Eriogonum alatum	-	-	-	-	-	-	.00	-
F	Erigeron spp.	4	-	-	1	-	-	-	-
F	Eriogonum spp.	-	4	2	-	2	2	.03	.01
F	Euphorbia spp.	$_{c}$137	$_{b}$41	20	55	18	9	.17	.04

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Gilia congesta	4	-	-	1	-	-	-	-
F	Hymenoxys richardsonii	-	-	5	-	-	2	-	.01
F	Lappula occidentalis (a)	-	-	3	-	-	1	-	.00
F	Leucelene ericoides	$_{a}$-	$_{b}$3	$_{ab}$3	-	1	1	.15	.03
F	Lepidium montanum	2	-	-	1	-	-	-	-
F	Machaeranthera grindelioides	-	1	-	-	1	-	.00	-
F	Medicago sativa	$_{b}$5	$_{a}$-	$_{a}$-	3	-	-	.00	-
F	Penstemon cyananthus	$_{b}$32	$_{a}$2	$_{a}$2	19	2	1	.03	.00
F	Salsola iberica (a)	-	5	-	-	2	-	.01	-
F	Schoencrambe linifolia	10	4	4	6	3	2	.02	.04
F	Thelesperma subnudum	15	16	-	7	6	-	.08	-
F	Townsendia incana	$_{b}$6	$_{ab}$6	$_{a}$5	4	2	2	.01	.01
F	Unknown forb-perennial	3	-	-	1	-	-	-	-
Total for Annual Forbs		0	16	6	0	7	2	0.03	0.00
Total for Perennial Forbs		292	125	63	131	58	29	1.17	0.51
Total for Forbs		292	141	69	131	65	31	1.21	0.52

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 14

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Ceratoides lanata	0	0	-	-
B	Cercocarpus montanus	6	6	.63	1.28
B	Chrysothamnus nauseosus	0	1	-	-
B	Ephedra viridis	15	15	1.08	4.49
B	Eriogonum microthecum	11	4	.00	.03
B	Juniperus osteosperma	0	6	.93	3.20
B	Opuntia spp.	1	0	-	-
B	Pinus edulis	0	13	3.31	4.06
B	Purshia tridentata	1	3	.03	-
B	Yucca harrimaniae	28	33	2.65	4.41
Total for Browse		62	81	8.65	17.49

CANOPY COVER --
Herd unit 16C, Study no: 14

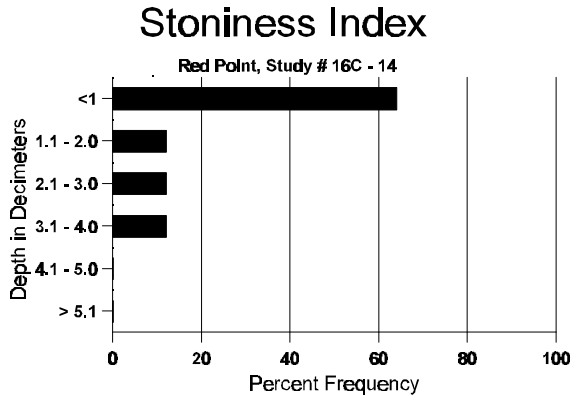
Species	Percent Cover '99
Juniperus osteosperma	2
Pinus edulis	2

BASIC COVER --
Herd unit 16C, Study no: 14

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	282	307	3.50	19.52	27.82
Rock	251	234	14.25	13.35	18.65
Pavement	274	258	7.00	4.23	8.49
Litter	382	363	37.25	41.90	34.64
Cryptogams	10	40	0	.02	1.52
Bare Ground	248	244	38.00	17.68	17.72

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 14, Study Name: Red Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.1	34.6 (17.4)	7.6	46.7	29.4	23.8	3.4	4.1	102.4	0.9



PELLET GROUP DATA --
Herd unit 16C, Study no: 14

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	30	56	n/a
Elk	35	40	55 (136)
Deer	19	33	25 (62)
Cattle	-	4	4 (10)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 14

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceratoides lanata																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	11	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	0		-
	'94	0		-
	'99	0		-

Cercocarpus montanus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	1	-	-	-	-	-	-	2	-	-	-	40			2
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	2	3	1	-	-	-	-	-	5	1	-	-	400	50	41	6
	94	-	3	1	-	-	-	-	-	-	4	-	-	-	80	46	69	4
	99	-	2	1	-	-	1	1	-	-	5	-	-	-	100	54	58	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	33%	50%	00%	-70%
'94	50%	33%	00%	+14%
'99	29%	29%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	400		-
	'94	120		-
	'99	140		-

Chrysothamnus nauseosus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	10	0
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	100%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	0		-
	'94	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ephedra viridis																		
Y	88	1	5	1	-	-	-	-	-	-	7	-	-	-	466			7
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	2	-	1	-	-	-	-	-	-	3	-	-	-	60			3
M	88	-	6	-	-	-	-	-	-	-	6	-	-	-	400	24	30	6
	94	22	-	-	-	-	-	-	-	-	22	-	-	-	440	38	56	22
	99	9	12	-	-	1	-	-	-	-	22	-	-	-	440	37	54	22
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	85%	08%	00%	-40%
'94	00%	00%	00%	- 4%
'99	52%	04%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	866	Dec:	-
	'94	520		-
	'99	500		-

Eriogonum microthecum																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	29	-	-	-	-	-	-	-	-	29	-	-	-	580			29
	99	4	-	3	-	-	-	-	-	-	7	-	-	-	140			7
M	88	5	-	-	-	-	-	-	-	-	5	-	-	-	333	2	2	5
	94	35	-	-	-	-	-	-	-	-	35	-	-	-	700	3	4	35
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	3	2
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	3	4	-	-	-	-	-	7	140			7
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+58%
'94	00%	00%	00%	-75%
'99	00%	38%	44%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	533	Dec:	0%
	'94	1280		0%
	'99	320		44%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
Y	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	200	Dec:	-
	'94	0		-
	'99	120		-

Opuntia spp.																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	11	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	50%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	40		50%
	'99	0		0%

Pinus edulis																		
Y	88	5	-	-	-	-	-	1	-	-	6	-	-	-	400			6
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	2	-	-	-	-	-	5	-	-	-	100			5
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	7	-	-	1	-	-	-	-	-	7	-	1	-	160	23	26	8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	08%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	400	Dec:	-
	'94	0		-
	'99	260		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	20	1
	99	6	-	-	-	-	-	-	-	-	-	-	-	-	120	22	29	6
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	1	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-70%
'94	00%	00%	00%	+88%
'99	00%	25%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	0%
	'94	20		0%
	'99	160		13%

Yucca harrimaniae																		
Y	88	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	88	24	-	-	-	-	-	-	-	-	24	-	-	-	1600	17	15	24
	94	84	-	-	-	-	-	-	-	-	82	-	2	-	1680	14	21	84
	99	97	-	-	-	-	-	-	-	-	97	-	-	-	1940	14	18	97
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-21%
'94	00%	00%	02%	+20%
'99	00%	00%	.95%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	2133	Dec:	0%
	'94	1680		0%
	'99	2100		2%

Trend Study 16C-15-99

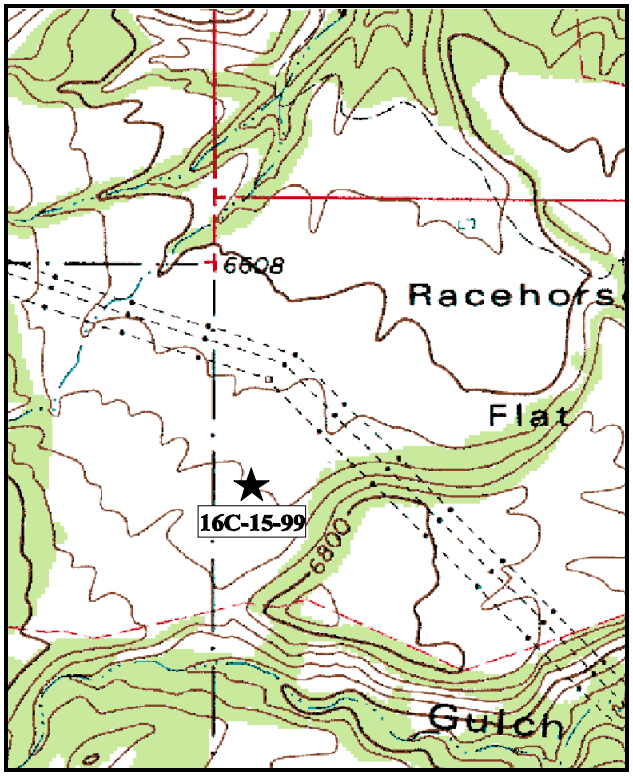
Study site name: Howard FS Chaining . Range type: Chained, Seeded P-J .

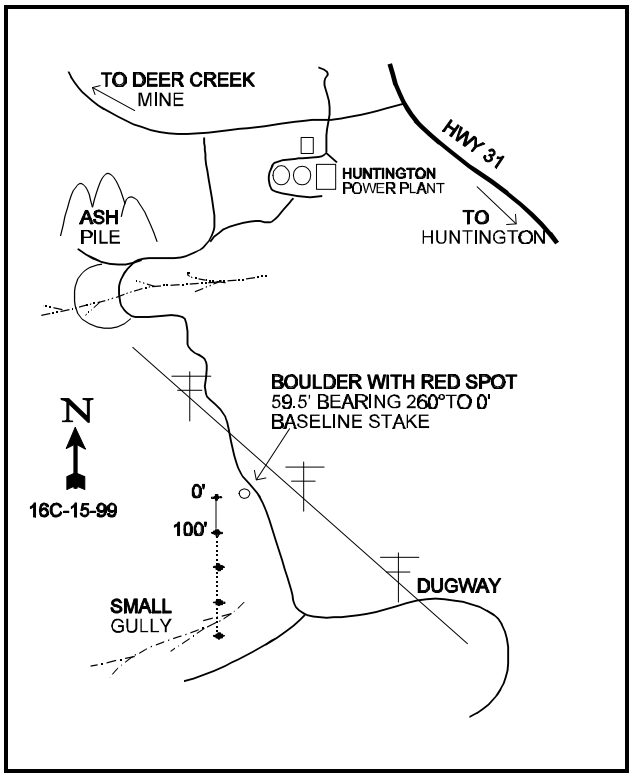
Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

The shortest route to reach this study area is through the Huntington Power Plant. From the main building, go through the plant to the SE gate. Continue on the paved road 0.85 miles to a fork. The plant's ash pile is on the right. Bear left to a bridge or continue around the head of a small draw, following the road southeast towards the powerline. About 0.15 miles from the bridge there is an old fence. Go 0.1 miles to another fence. Continue up through the chaining, past the powerlines, for 0.25 miles to a large white rock with a red-painted spot, on the right side of the road. From the rock, walk 60 feet west to the first baseline stake. The fencepost is marked with browse tag #7881. The other study stakes run south at 100 foot intervals.





Map Name: Red Point

Diagrammatic Sketch

Township 17S , Range 8E , Section 7

UTM 4356668.380 N, 493455.281 E

DISCUSSION

Trend Study No. 16C-15 (31-13)

Located on the BLM side of the fence on Racehorse Flat, by an area known as the Howard-Forest Service Chaining, this study site samples a pinyon-juniper/black sagebrush range site that was chained and seeded in the early 1970's. A variety of browse were seeded, including a palatable ecotype of basin big sagebrush. Like the previous study, it is in the West Huntington Cattle Allotment where reductions have been made in spring cattle grazing. This chaining appears to receive light use by cattle with abundant sign of deer winter use. Pellet group data from 1999 estimate 42 deer, 1 elk and 15 cow days use/acre (104 ddu/ha, 3 edu/ha, 37 cdu/ha). There was also some old sheep sign. A small percentage of the cow pats were fresh but most appeared to be from last season.

The study site has a northwest aspect with a 3-5% slope and an elevation of 6,650 feet. The soil is relatively shallow and very rocky with a high percentage of boulders on the surface and below. Effective rooting depth is estimated at 13 inches. Soil texture is a sandy clay loam with a slightly alkaline pH (7.6). Phosphorus levels are marginal at 6.3 ppm. Values less than 10 ppm can limit normal plant growth and development. There are areas of pavement concentration and small gullies, but abundant chaining debris and fair grass cover provide protection from serious soil loss.

The key browse species on the flat consist of a mixture of basin big sagebrush, black sagebrush, and Wyoming big sagebrush. There is apparently some hybridizing occurring between the Wyoming big sagebrush and the lower growing black sagebrush. All sagebrush species individually show evidence of moderate and some heavy use. The mature basin big sagebrush were tall, with good vigor, although there were few young or seedlings. Black sagebrush population also contains few seedling or young plants. Wyoming big sagebrush is the most common shrub on the site. It was identified as basin big sagebrush in 1988. Overall sagebrush density has decreased since 1988, due to a major decline in the number of young plants. Drought conditions combined with increasing competition with pinyon and juniper trees probably caused this mortality.

Pinyon and juniper appear to be decreasing slightly on the site with point-center quarter data from 1994 estimating 445 trees/acre, with 23% pinyon and 77% juniper. Data from 1999 estimate 411 trees/acre. Density of juniper is estimated at 321 trees/acre with an average diameter of 2.1 inches. Pinyon number 90 trees/acre with an average diameter of 5 inches. Pinyon is around 10 feet in height while juniper averages around 6 feet. Neither species is producing many cones.

Other, less abundant preferred browse found on the site include, white rubber rabbitbrush, four-wing saltbush, and true mountain mahogany. True mountain mahogany is mostly unavailable, moderately to heavily used, and in poor vigor. White rubber rabbitbrush is fairly abundant but appears to be declining. It currently (‘99) displays moderate to heavy use and declining recruitment, poor vigor, and increasing decadency.

The herbaceous understory is poor and produces less than 6% cover. The seeded crested wheatgrass is the only abundant herbaceous species on the site. It provided 96% of the grass cover and 82% of the herbaceous cover in 1994. By 1999, crested wheatgrass accounted for 92% of the grass cover and 84% of the total herbaceous cover. Intermediate wheatgrass, smooth brome, Indian ricegrass, bottlebrush squirreltail, and Russian wildrye were all encountered in 1988, however only Russian wildrye and few Indian ricegrass plants were found in 1999. Native forbs are rare, except for a *Cryptantha spp*. and a few annual mustards.

1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1988, with the exception of litter cover which has declined. This is primarily the result of diminishing chaining debris. Percent bare ground has remained fairly

stable, although increasing slightly. Soil trend is still considered stable. The browse trend is down slightly due to the lack of seedlings and the large decline in young plants. This trend will most likely be reversed when normal precipitation patterns return. Trend for herbaceous plants is slightly down due to a decline in the sum of nested frequencies for grasses and forbs.

TREND ASSESSMENT
soil - stable
browse - slightly down, very little recruitment
herbaceous understory - slightly down

1999 TREND ASSESSMENT

Trend for soil is stable due to similar ground cover characteristics compared to those of 1994. Trend for browse is stable with respect to sagebrush. Density of all sagebrush species combined has remained similar to 1994 estimates. Seedlings and young plants are still limited, but at slightly higher levels compared to 1994. It appears that the basin big sagebrush are not doing as well as the black and Wyoming big sagebrush. Nearly 1/3 of the basin big sagebrush sampled display poor vigor and percent decadence has increased from 10% in 1994 to 32% currently. Rubber rabbitbrush is also showing signs of decline. It's population density has declined 36%, with 34% of the population displaying poor vigor, and percent decadence increase from 11% to 54%. No seedlings have been found on the site since 1988 and the proportion of young plants has steadily declined from 90% in 1988, to 22% in 1994, and only 9% by 1999. Released pinyon and juniper trees appear to be increasing in size. They provided 52% of the browse cover in 1994 and 61% in 1999. Taking all of these factors into consideration, trend for browse is considered stable since the key species, Wyoming big sagebrush, appears to have a stable population, the one that is best adapted to the drought conditions. Use is heavier than in 1994, but vigor has improved slightly, young recruitment has improved, and percent decadence has remained similar (23% vs 21%). This trend will change for the worse as the pinyon and juniper trees increase in size and density. Trend for the herbaceous understory is up slightly for perennial grasses but down for forbs. Overall the herbaceous understory is poor with grasses and forbs producing only about 6% cover in 1994 and 1999. Crested wheatgrass is the dominant species. It currently provides 92% of the grass cover and 84% of the herbaceous cover. It declined significantly in nested frequency between 1988 and 1994, but it has increased significantly since 1994. Forbs are rare and provide less than ½ of 1% cover. Trend is considered up slightly.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - up slightly but poor

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron cristatum	$_{b}$246	$_{a}$186	$_{b}$233	85	77	83	5.15	4.95
G	Agropyron intermedium	6	2	-	3	1	-	.00	-
G	Bromus inermis	4	-	-	3	-	-	-	-
G	Elymus junceus	$_{b}$35	$_{a}$9	$_{a}$11	16	3	6	.18	.42
G	Oryzopsis hymenoides	7	5	3	3	2	1	.04	.01
G	Poa fendleriana	-	1	-	-	1	-	.00	-
G	Sitanion hystrix	$_{b}$28	$_{a}$-	$_{a}$-	12	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		326	203	247	122	84	90	5.39	5.39
Total for Grasses		326	203	247	122	84	90	5.39	5.39
F	Arabis spp.	15	4	1	6	2	1	.01	.00
F	Chenopodium album (a)	-	$_{b}$7	$_{a}$-	-	3	-	.01	-
F	Cirsium spp.	1	-	-	1	-	-	-	-
F	Cryptantha spp.	$_{b}$100	$_{ab}$67	$_{a}$36	45	31	19	.58	.32
F	Descurainia pinnata (a)	-	$_{b}$21	$_{a}$-	-	10	-	.05	-
F	Draba spp. (a)	-	1	-	-	1	-	.00	-
F	Eriogonum umbellatum	16	18	8	9	8	3	.04	.04
F	Medicago sativa	3	-	-	2	-	-	-	-
F	Penstemon spp.	18	9	12	9	7	6	.03	.05
F	Ranunculus testiculatus (a)	-	-	1	-	-	1	-	.00
F	Salsola iberica (a)	-	$_{b}$23	$_{a}$-	-	9	-	.09	-
F	Schoencrambe linifolia	$_{b}$16	$_{ab}$13	$_{a}$5	11	6	3	.05	.01
F	Streptanthus cordatus	-	-	2	-	-	1	-	.00
F	Taraxacum officinale	2	-	-	1	-	-	-	-
F	Townsendia incana	2	-	-	2	-	-	-	-
F	Unknown forb-perennial	4	-	-	3	-	-	-	-
Total for Annual Forbs		0	52	1	0	23	1	0.16	0.00
Total for Perennial Forbs		177	111	64	89	54	33	0.72	0.44
Total for Forbs		177	163	65	89	77	34	0.89	0.44

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 15

Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Artemisia nova	16	10	.45	.18
B	Artemisia tridentata tridentata	10	16	.85	.75
B	Artemisia tridentata wyomingensis	39	34	2.58	2.59
B	Atriplex canescens	1	0	-	-
B	Cercocarpus montanus	2	2	-	-
B	Chrysothamnus nauseosus	-	-	-	.74
B	Chrysothamnus nauseosus albicaulis	37	28	1.36	1.12
B	Juniperus osteosperma	0	24	2.03	3.29
B	Opuntia spp.	2	0	-	-
B	Pinus edulis	0	8	3.84	5.18
B	Pinus edulis chained	0	0	-	-
B	Purshia tridentata	0	0	-	-
Total for Browse		107	122	11.14	13.88

CANOPY COVER --
Herd unit 16C, Study no: 15

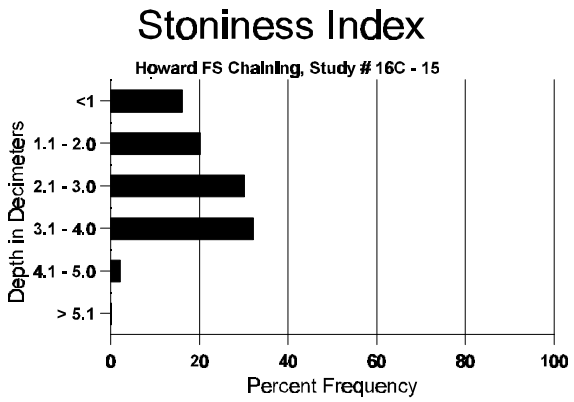
Species	Percent Cover '99
Juniperus osteosperma	2
Pinus edulis	5

BASIC COVER --
Herd unit 16C, Study no: 15

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	253	254	3.25	17.63	18.36
Rock	256	184	12.25	10.96	8.97
Pavement	304	276	4.00	2.89	7.18
Litter	343	379	52.50	29.82	36.51
Cryptogams	10	41	0	.03	.81
Bare Ground	301	301	28.00	29.45	30.02

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 15, Study Name: Howard FS Chaining

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.0	55.6 (13.9)	7.6	54.7	23.4	21.8	5.1	6.3	80.0	0.8



PELLET GROUP DATA --
Herd unit 16C, Study no: 15

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Sheep	-	3	12 (30)
Rabbit	11	53	n/a
Elk	4	5	1 (2)
Deer	62	51	42 (104)
Cattle	1	5	15 (37)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 15

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	14	1
	94	15	20	6	-	-	-	-	-	-	41	-	-	-	820	8	20	41
	99	1	13	5	-	-	2	-	-	-	21	-	-	-	420	6	16	21
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	4	4	2	-	-	-	-	-	-	8	-	-	2	200			10
	99	-	3	-	-	1	-	-	-	-	4	-	-	-	80			4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+94%
'94	47%	16%	04%	-47%
'99	63%	26%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	66	Dec:	0%
'94	1020		20%
'99	540		15%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata tridentata																		
S	88	20	-	1	-	-	-	7	-	-	28	-	-	-	1866			28
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	44	12	-	3	-	-	8	-	-	67	-	-	-	4466			67
	94	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	88	3	2	2	-	-	-	-	-	-	4	-	3	-	466	30	28	7
	94	5	2	-	-	-	-	-	-	-	7	-	-	-	140	41	46	7
	99	2	5	1	2	-	-	-	-	-	10	-	-	-	200	31	34	10
D	88	1	1	1	-	-	-	-	-	-	2	-	1	-	200			3
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	5	1	-	1	-	-	-	-	-	1	-	-	6	140			7
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	19%	04%	05%	-96%
'94	20%	00%	00%	+55%
'99	27%	05%	27%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	5132	Dec:		4%
'94	200			10%
'99	440			32%

Artemisia tridentata wyomingensis																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	7	2	-	-	-	-	-	-	-	9	-	-	-	180			9
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	34	14	-	1	-	-	-	-	-	47	-	-	2	980	21	25	49
	99	18	29	8	2	-	2	-	-	-	58	1	-	-	1180	17	24	59
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	10	2	2	1	-	-	-	-	-	3	-	-	12	300			15
	99	4	6	4	-	1	2	1	-	-	9	-	1	8	360			18
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	25%	03%	22%	+24%
'99	44%	19%	10%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	0%
'94	1300		23%
'99	1720		21%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Atriplex canescens																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	30	29	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	25	18	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	0		-

Cercocarpus montanus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	19	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	1	1	-	-	-	1	-	-	1	40			2
	99	-	1	-	-	1	-	-	-	-	-	-	-	2	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	50%	50%	50%	+ 0%
'99	100%	00%	100%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	40		100%
	'99	40		100%

Chrysothamnus nauseosus albicaulis																		
S	88	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	15	11	1	-	-	-	-	-	-	25	-	1	1	1800			27
	94	9	1	1	1	-	-	-	-	-	12	-	-	-	240			12
	99	2	-	-	-	-	1	-	-	-	2	-	-	1	60			3
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	29	21	1
	94	34	1	1	1	-	-	-	-	-	37	-	-	-	740	23	25	37
	99	1	3	3	-	4	2	-	-	-	11	1	1	-	260	37	36	13
D	88	1	-	1	-	-	-	-	-	-	2	-	-	-	133			2
	94	4	1	1	-	-	-	-	-	-	5	-	-	1	120			6
	99	1	7	2	1	-	6	2	-	-	9	-	-	10	380			19
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	37%	07%	07%	-45%
'94	05%	05%	02%	-36%
'99	40%	40%	34%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1999	Dec:	7%
	'94	1100		11%
	'99	700		54%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
Y	88	13	-	-	1	-	-	-	-	-	11	-	3	-	933			14
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	21	-	-	-	-	-	-	-	-	19	-	1	1	420			21
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	6	-	-	-	-	-	-	-	-	5	-	1	-	120	-	-	6
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	21%
'94	00%	00%	00%
'99	00%	00%	11%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	933	Dec:	-
	'94	0		-
	'99	540		-

Opuntia spp.																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	3	12	4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	80		-
	'99	0		-

Pinus edulis																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140	-	-	7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	200	Dec:	-
	'94	0		-
	'99	160		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis chained																		
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'88	66	Dec:		100%
'94	0			0%
'99	0			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	32	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	0			-

Trend Study 16C-17-99

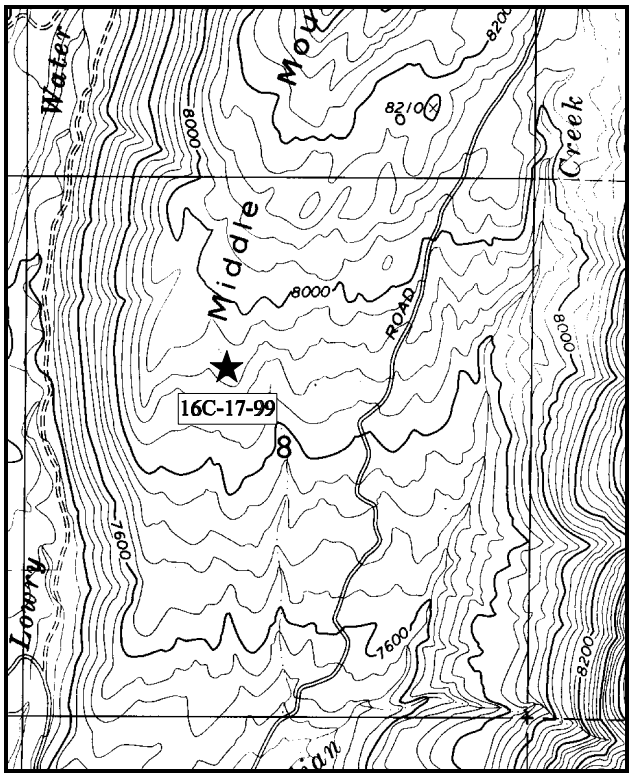
Study site name: Middle Mountain . Range type: Chained, Seeded P-J .

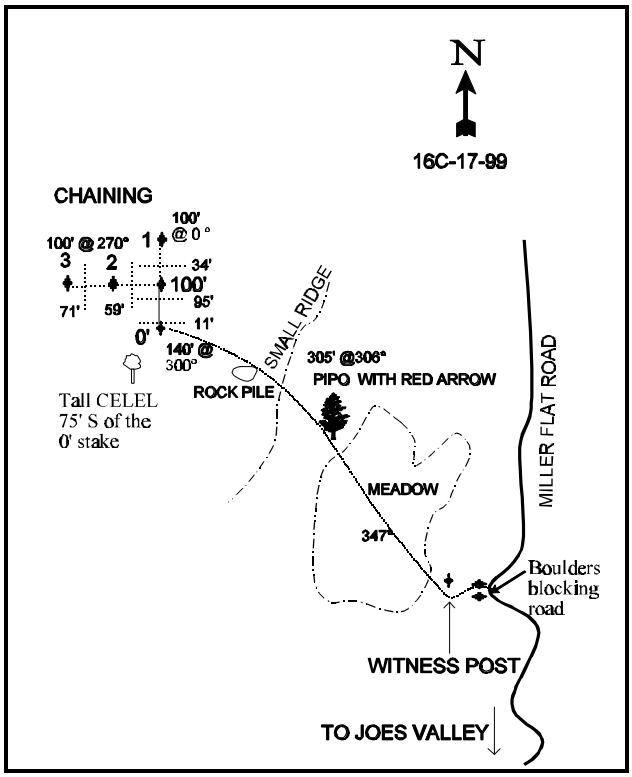
Compass bearing: frequency baseline 345°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the paved highway at the north end of Joes Valley Reservoir, proceed north on the Upper Joes Valley road (Millers Flat road) for 1.2 miles. Stay right at the fork and continue l.2 miles to another fork. Stay right (on the Indian Creek side) and go 1.1 miles to a faint turnoff to the left. Park by the witness post which is about 75 yards off the main road. From the witness post, walk NNW to the upper end of the meadow to the lighting-scarred Ponderosa with a red arrow painted on it. From the pine tree walk NW 100 yards to a pile of rocks painted red. From the rock pile, walk NW (300/) for 140 feet to the 0-foot baseline stake. The 1st stake has a red browse tag #9018 attached.





Map Name: Joes Valley Reservoir Diagrammatic Sketch

Township 17S , Range 6E , Section 8 UTM 4357009.311 N, 476952.638 E

DISCUSSION

Trend Study No. 16C-17 (31-15)

The Middle Mountain site is a diverse, productive area of high elevation range used by both deer and elk as winter-spring range. The study is located at the upper end of a small (approximately 200 acre) chaining on a slope where the pinyon and juniper trees were never very dense. It is more of a mixed mountain brush site. The gradual, southwest-facing slope allows for use during most winters. The slope is open, but nearby stands of Ponderosa pine, aspen, and mature curlleaf mountain mahogany on the ridge provide excellent cover and additional foraging opportunities. The elevation is 8,100 feet. The lower end of the chaining is dominated by grass, where there is less sign of big game use. Pellet group data from 1999 estimate 26 deer and 35 elk days use/acre (64 ddu/ha and 87 edu/ha). Sheep sign was also encountered and some animals could be heard in the area. One moose pellet group was also encountered on the site.

There are some sandstone rocks on the surface, but overall the soil is moderately deep and free of rocks. Effective rooting depth is estimated at just over 15 inches. Depth measurements were limited by a compacted soil horizon. The soil has a clay to sandy clay loam texture and a neutral pH (7.2). Phosphorus is very limited at just 2 ppm, the lowest reading of any site in 16C. Values less than 10 ppm can limit normal plant growth and development. There is little rock or pavement on the surface. There is some localized soil movement occurring on the site, including some small rills about 10 to 20 feet in length in places. There are no gullies however. A network of game trails that lack cover show signs of some active erosion.

The site supports a variety of desirable browse species including, mountain big sagebrush, black sagebrush, Utah serviceberry, and true mountain mahogany. Mountain big sagebrush and black sagebrush display moderate to heavy use, good vigor and low percent decadence. The population of black sagebrush has increased steadily since 1988 from 599 plants/acre to 2,480 in 1999. Mountain big sagebrush has declined slightly in density since 1988 (1,933 to 1,540 plants/acre). Other key preferred browse species are true mountain mahogany and Utah serviceberry. The true mountain mahogany population density has steadily increased since 1988. Mature plants average 2 to 2 ½ feet in height, show moderate to heavy use, and are in good vigor. Leader growth was excellent in 1999 at about 9 inches, but some of the new leaves were withered due to insect damage. Serviceberry is less abundant with an estimated density of 440 plants/acre in 1994 and 620 in 1999. The average mature plant has increased in height from about 1 foot in 1994 to nearly 3 feet by 1999. These shrubs have been heavily hedged in the past but currently (‘99) show mostly light to moderate use and good vigor.

Some fair forage is provided by the numerous but small dwarf rabbitbrush whose population density was estimated at 5,240 plants/acre in 1994 and 4,760 in 1999. These shrubs provided 18% of the browse cover in 1994 and 19% in 1999. Additional forage is provided by small populations of curlleaf mahogany, antelope bitterbrush, and snowberry. Pinyon and juniper trees can be found scattered throughout the site in small numbers. Point quarter data from 1999 estimate 24 juniper and 20 pinyon trees/acre with average diameters of 3.1 and 1.6 inches respectively. A few white pine trees were also encountered.

The herbaceous understory is diverse and abundant. Salina wildrye is the dominant grasses. It provided 79% of the grass cover in 1994 and 77% in 1999. The only other common grass is prairie June grass. Forbs are also diverse and abundant. Common species include pussy toes, aster, bastard toadflax, Eaton fleabane, thistle, and desert phlox.

1994 TREND ASSESSMENT

Ground cover characteristics have changed considerable since 1988. Percent bare ground has more than tripled and litter cover has declined by 73%. Nested frequency of herbaceous vegetation has declined slightly, but it is still abundant. Trend for soil is down. The browse trend is currently stable. The key species

display stable population densities, reduced heavy utilization and good vigor. The herbaceous understory trend is stable. Sum of nested frequency for grasses have increased slightly, while those of forbs have declined slightly. This decline is due to drought conditions which have persisted over the past several years.

TREND ASSESSMENT
soil - down
browse - stable
herbaceous understory - stable

1999 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground from 44% to 39% and an increase in litter cover from 20% to 27%. Vegetative cover also increased from 30% to 39%. Trend for browse is up for serviceberry, black sagebrush, and true mountain mahogany. Densities of these key species have increased, vigor has improved, and percent decadence is lower. Heavy use is also lower on serviceberry and mahogany. Mountain big sagebrush is another key species which provides 23% of the shrub cover. Density has declined slightly since 1994, but vigor has improved and percent decadence has declined from 33% to 16%. Overall trend for browse is considered up slightly. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has increased slightly, but the frequency of the dominant species, Salina wildrye, is stable. The sum of nested frequency of perennial forbs has declined slightly, although cover of forbs has increased nearly three fold. However, 73% of the forb cover comes from pussy toes, thistle, and bastard toadflax.

TREND ASSESSMENT
soil - up slightly
browse - up slightly
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 17

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	44	50	33	18	18	16	1.40	.54
G	Carex spp.	$_{b}$9	$_{a}$-	$_{a}$-	4	-	-	-	-
G	Elymus salina	244	258	264	83	88	90	11.48	11.38
G	Koeleria cristata	$_{a}$52	$_{a}$27	$_{b}$110	21	12	43	.26	2.42
G	Poa fendleriana	$_{b}$56	$_{c}$76	$_{a}$24	26	40	14	.86	.26
G	Poa secunda	$_{a}$-	$_{b}$12	$_{b}$22	-	5	8	.24	.14
G	Sitanion hystrix	-	-	2	-	-	1	-	.03
G	Stipa lettermani	$_{a}$-	$_{b}$7	$_{a}$-	-	4	-	.21	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		405	430	455	152	167	172	14.47	14.80
Total for Grasses		405	430	455	152	167	172	14.47	14.80
F	Allium spp.	$_{b}$54	$_{a}$-	$_{a}$-	25	-	-	-	-
F	Antennaria microphylla	$_{a}$13	$_{a}$14	$_{b}$92	4	7	41	.25	1.83

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	‰94	‰99
F	Androsace septentrionalis (a)	-	$_{a}$-	$_{b}$13	-	-	6	-	.13
F	Antennaria microphylla	$_{ab}$5	$_{b}$14	$_{a}$-	2	5	-	.10	-
F	Arabis spp.	-	3	-	-	1	-	.00	-
F	Astragalus convallarius	-	2	-	-	1	-	.00	-
F	Aster spp.	$_{a}$54	$_{b}$102	$_{a}$38	19	38	16	.56	.28
F	Astragalus spp.	2	5	7	2	4	4	.02	.19
F	Castilleja linariaefolia	5	-	4	2	-	2	-	.01
F	Calochortus nuttallii	-	-	3	-	-	1	-	.00
F	Cirsium spp.	105	94	98	47	46	47	.68	4.07
F	Comandra pallida	$_{b}$60	$_{a}$35	$_{c}$108	28	17	45	.13	2.89
F	Crepis acuminata	5	1	-	3	1	-	.00	-
F	Cryptantha spp.	2	4	-	1	2	-	.01	-
F	Cymopterus spp.	-	5	-	-	2	-	.01	-
F	Erigeron eatonii	$_{b}$159	$_{a}$79	$_{a}$54	66	38	26	.42	.30
F	Eriogonum umbellatum	2	7	-	1	2	-	.03	-
F	Hymenopappus filifolius	$_{a}$6	$_{ab}$20	$_{b}$24	4	11	11	.30	.52
F	Lesquerella spp.	-	-	2	-	-	1	-	.03
F	Lomatium grayi	$_{b}$38	$_{ab}$2	$_{a}$-	17	1	-	.00	-
F	Orthocarpus spp. (a)	-	$_{a}$-	$_{b}$21	-	-	12	-	.18
F	Penstemon caespitosus	76	66	-	37	28	-	.66	-
F	Penstemon lentus	4	-	-	2	-	-	-	-
F	Phlox austromontana	$_{a}$14	$_{b}$34	$_{ab}$28	7	18	16	.77	.82
F	Polygonum douglasii (a)	-	3	-	-	1	-	.00	-
F	Senecio multilobatus	3	-	-	1	-	-	-	-
F	Sphaeralcea coccinea	10	24	20	6	10	8	.10	.11
F	Taraxacum officinale	$_{b}$8	$_{a}$-	$_{a}$-	6	-	-	-	.03
Total for Annual Forbs		0	3	34	0	1	18	0.00	0.31
Total for Perennial Forbs		625	511	478	280	232	218	4.08	11.12
Total for Forbs		625	514	512	280	233	236	4.09	11.43

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 17

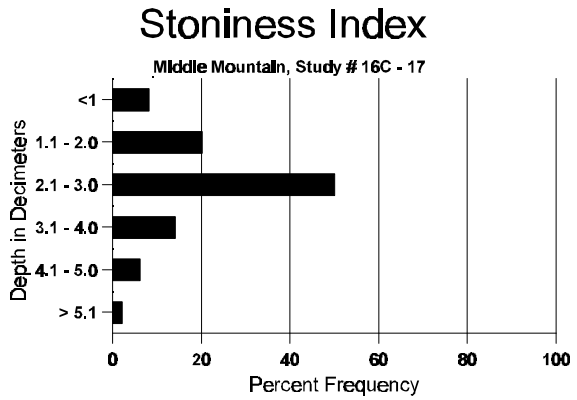
Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Amelanchier utahensis	20	14	.64	.86
B	Artemisia nova	41	61	2.90	4.92
B	Artemisia tridentata vaseyana	50	47	1.99	4.48
B	Cercocarpus ledifolius	2	1	-	-
B	Cercocarpus montanus	16	25	1.57	3.73
B	Chrysothamnus depressus	68	72	2.13	3.63
B	Chrysothamnus nauseosus	0	0	-	-
B	Chrysothamnus viscidiflorus	5	4	.18	.03
B	Gutierrezia sarothrae	53	26	1.48	.39
B	Opuntia spp.	3	5	.01	.00
B	Pinus edulis	0	3	-	.38
B	Purshia tridentata	2	2	-	.00
B	Quercus gambelii	0	0	-	-
B	Symphoricarpos oreophilus	13	10	.84	.82
B	Tetradymia canescens	0	0	-	-
Total for Browse		273	270	11.76	19.25

BASIC COVER --
Herd unit 16C, Study no: 17

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	340	346	5.75	29.73	39.15
Rock	45	35	6.50	2.62	2.79
Pavement	13	24	0	.03	.09
Litter	370	361	74.25	19.81	27.38
Cryptogams	23	23	0	.60	.55
Bare Ground	354	324	13.50	44.09	38.95

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 17, Study Name: Middle Mountain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.2	53.2 (17.0)	7.2	44.4	13.8	41.8	1.4	2.0	76.8	0.6



PELLET GROUP DATA --
Herd unit 16C, Study no: 17

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Sheep	-	2	11 (27)
Rabbit	9	30	n/a
Elk	43	21	35 (87)
Deer	18	9	26 (64)
Cattle	1	-	0

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 17

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	88	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	11	1	24	-	-	-	-	-	-	32	-	4	-	1200			36
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	15	4	1	1	1	-	1	-	-	23	-	-	-	460			23
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	3	4	5	2	1	1	2	-	-	18	-	-	-	360	11	15	18
	99	4	3	1	-	-	-	-	-	-	8	-	-	-	160	35	30	8
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	1	1	-	-	-	-	-	-	1	-	-	1	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	03%	67%	11%	-63%
'94	27%	32%	05%	+29%
'99	26%	06%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1200	Dec:	0%
	'94	440		9%
	'99	620		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	88	9	1	-	-	-	-	-	-	-	9	-	-	1	333			10
	94	25	1	1	-	-	-	-	-	-	27	-	-	-	540			27
	99	12	2	-	-	-	-	-	-	-	14	-	-	-	280			14
M	88	3	1	-	-	-	-	-	-	-	4	-	-	-	133	7	8	4
	94	47	3	-	3	-	-	-	-	-	53	-	-	-	1060	8	19	53
	99	34	32	19	1	6	3	-	-	-	95	-	-	-	1900	11	20	95
D	88	-	3	1	-	-	-	-	-	-	4	-	-	-	133			4
	94	8	6	-	-	-	-	-	-	-	9	-	-	5	280			14
	99	5	5	4	-	1	-	-	-	-	10	-	-	5	300			15
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	28%	06%	06%	+68%
'94	11%	01%	05%	+24%
'99	37%	21%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	599	Dec:		22%
'94	1880			15%
'99	2480			12%

Artemisia tridentata vaseyana																		
S	88	6	5	8	-	-	-	-	-	-	16	-	1	2	633			19
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	8	4	-	-	-	-	-	-	-	11	-	-	1	400			12
	94	4	1	-	-	-	-	-	-	-	5	-	-	-	100			5
	99	11	2	-	-	-	-	-	-	-	12	-	1	-	260			13
M	88	4	6	14	-	-	-	-	-	-	23	1	-	-	800	17	23	24
	94	52	12	2	2	-	-	-	-	-	68	-	-	-	1360	14	25	68
	99	25	16	8	1	-	2	-	-	-	52	-	-	-	1040	19	30	52
D	88	4	5	12	-	1	-	-	-	-	19	-	-	3	733			22
	94	16	17	3	-	-	-	-	-	-	22	-	-	14	720			36
	99	3	4	1	1	-	3	-	-	-	8	-	-	4	240			12
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	460			23
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	300			15

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	28%	45%	07%	+11%
'94	28%	05%	13%	-29%
'99	29%	18%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1933	Dec:		38%
'94	2180			33%
'99	1540			16%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus ledifolius																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	1	-	-	-	-	-	-	-	2	-	-	-	40	14	18	2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	38	32	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	50%	00%	00%	-50%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	40		-
	'99	20		-

Cercocarpus montanus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	1	1	7	-	-	-	-	-	-	9	-	-	-	300			9
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	3	3	-	-	-	-	-	-	-	6	-	-	-	120			6
M	88	-	-	2	-	-	-	-	-	-	2	-	-	-	66	28	37	2
	94	1	6	18	-	-	-	-	-	-	25	-	-	-	500	19	37	25
	99	6	16	10	-	-	-	-	-	-	32	-	-	-	640	28	36	32
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	1	-	-	-	-	-	-	-	-	-	3	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	09%	82%	00%	+37%
'94	21%	66%	10%	+24%
'99	50%	26%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	366	Dec:	0%
	'94	580		10%
	'99	760		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	88	28	16	11	-	-	-	-	-	-	55	-	-	-	1833			55
	94	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
	99	24	3	-	-	-	-	-	-	-	27	-	-	-	540			27
M	88	25	8	4	1	-	1	-	-	-	37	1	1	-	1300	4	10	39
	94	214	4	-	13	-	-	-	-	-	231	-	-	-	4620	3	8	231
	99	154	34	15	1	-	-	-	-	-	204	-	-	-	4080	4	11	204
D	88	-	1	1	-	-	-	-	-	-	2	-	-	-	66			2
	94	15	3	-	-	-	-	-	-	-	10	-	5	3	360			18
	99	4	3	-	-	-	-	-	-	-	6	-	-	1	140			7
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	26%	18%	01%	+39%
'94	03%	00%	03%	- 9%
'99	17%	06%	.42%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	3199	Dec:	2%
	'94	5240		7%
	'99	4760		3%

Chrysothamnus nauseosus																		
M	88	1	-	-	-	-	-	-	-	-	-	-	1	-	33	20	19	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	100%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	33	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
Y	88	3	1	-	-	-	-	-	-	-	4	-	-	-	133			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	5	-	-	-	-	-	-	-	-	5	-	-	-	166	9	12	5
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	7	8	4
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	11	17	6
D	88	-	1	1	-	-	-	-	-	-	2	-	-	-	66			2
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	18%	09%	00%	-73%
'94	00%	00%	20%	+17%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	365	Dec:	18%
	'94	100		20%
	'99	120		0%

Gutierrezia sarothrae																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	88	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
	99	14	-	-	-	-	-	-	-	-	13	1	-	-	280			14
M	88	19	1	-	-	-	-	-	-	-	20	-	-	-	666	5	4	20
	94	151	-	-	-	-	-	-	-	-	151	-	-	-	3020	6	7	151
	99	61	-	-	-	-	-	-	-	-	61	-	-	-	1220	6	7	61
D	88	1	-	-	-	-	-	-	-	-	-	-	-	1	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	04%	00%	04%	+72%
'94	00%	00%	00%	-53%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	899	Dec:	4%
	'94	3220		0%
	'99	1500		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	12	2
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	8	2
D	88	1	-	-	-	-	-	-	-	-	-	-	-	1	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	100%	+59%
'94	00%	00%	00%	+20%
'99	00%	00%	20%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	33	Dec:	100%
	'94	80		0%
	'99	100		20%

Pinus edulis																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	33	Dec:	-
	'94	0		-
	'99	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	4	-	-	-	-	-	-	-	3	-	-	1	80	13	30	4
	99	-	-	3	-	-	-	-	-	-	3	-	-	-	60	18	76	3
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	1	1	-	-	-	-	-	-	1	-	-	1	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	71%	14%	29%	-57%
'99	00%	100%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	140		29%
	'99	60		0%

Quercus gambelii

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	33	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	88	1	1	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	4	4	7	-	-	-	-	-	-	15	-	-	-	500			15
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	1	1	-	-	40			2
M	88	-	1	3	-	-	-	-	-	-	4	-	-	-	133	11	19	4
	94	6	13	-	2	-	-	-	-	-	21	-	-	-	420	8	16	21
	99	8	2	-	-	-	-	-	-	-	10	-	-	-	200	12	25	10
D	88	-	-	2	-	-	-	-	-	-	2	-	-	-	66			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	24%	57%	00%	-37%
'94	59%	00%	00%	-45%
'99	17%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	699	Dec:		9%
'94	440			0%
'99	240			0%

Tetradymia canescens																		
M	88	-	1	-	-	-	-	-	-	-	1	-	-	-	33	9	10	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	100%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	33	Dec:	-
'94	0		-
'99	0		-

Trend Study 16C-18-99

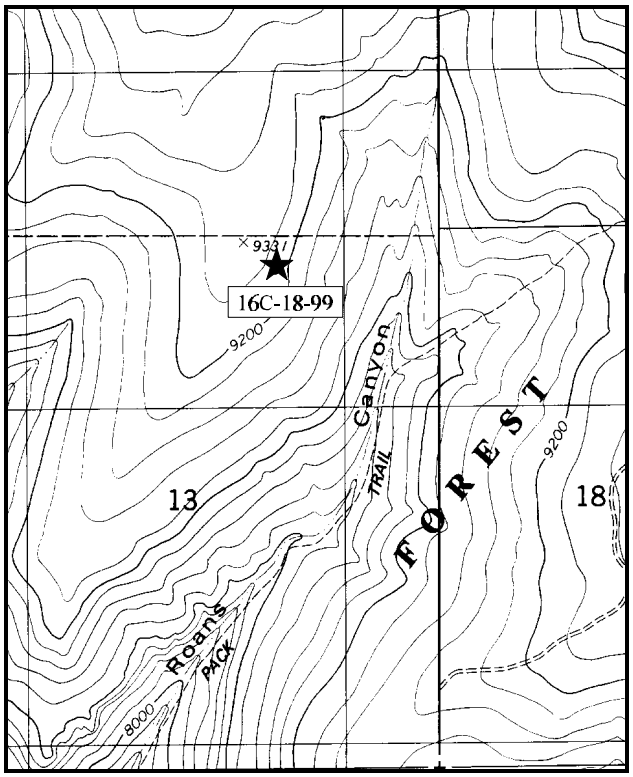
Study site name: East Mountain . Range type: Big Sagebrush - Grass .

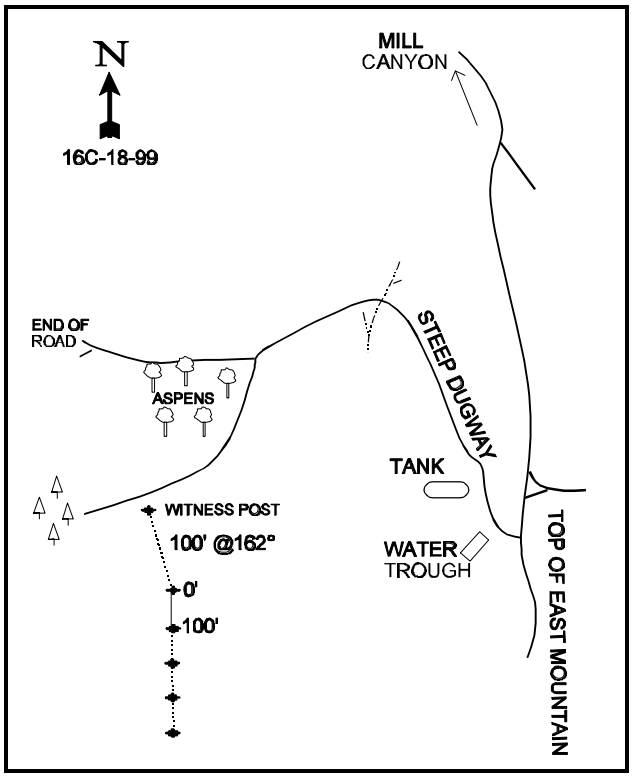
Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts} line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Orangeville, go up Straight Canyon to a major fork at Cottonwood Creek. Bear right up Cottonwood Creek approximately 7.5 miles to Mill Canyon. Turn right and go up Mill Canyon 2.7 miles to a fork at the top of East Mountain. Bear right on the main road 0.6 miles to a fork to Pine Springs - Snow Lake. Continue on the main road 0.55 miles. Turn right here down off the main road. Go 0.15 miles to a spring. Continue 0.15 miles to the creek at the bottom of the dugway. Go 0.2 miles to a fork by a patch of aspens, bear left on the faint road. Wind down through the trees and out onto the sage/grass ridge for 0.75 miles. There is a witness post on the left side of the road. From the witness post, walk 70 paces SSE to a 18" fencepost marked by a red browse tag, #7162. This is the 0-foot baseline stake.





Map Name: Mahogany Point

Diagrammatic Sketch

Township 17S , Range 6E , Section 13

UTM 4355370.962 N, 483670.761 E

DISCUSSION

Trend Study No. 16C-18 (31-16)

The East Mountain trend study is located on a low point on the west side of the plateau above Roans Canyon and Cottonwood Creek. It is on Forest Service land, on the East Mountain allotment which is grazed by 446 cows from June 21 to September 10. Much of the area was sprayed to kill sagebrush in the late 1960's. The site is on a slope where the majority of the mountain big sagebrush was not affected. The lower end of the study baseline was affected more by the treatment and showed a lower density of mountain big sagebrush than the beginning of the line. The study site is on a south-southwest slope of 6-8%. The elevation is 9,200 feet. Elk winter on the points and windswept south-facing slopes. Deer sign was only occasionally observed. Pellet group data from 1999 estimate 17 deer and 55 elk days use/acre (42 ddu/ha and 136 edu/ha).

The loose surface soil has a clay loam texture and neutral pH (7.3). It is relatively deep with an effective rooting depth of just over 17 inches. There are few rocks in the profile, except near the shallow ridge top. Phosphorus is limited on this site with a value of only 3.8 ppm. Values less than 10 ppm can limit normal plant growth and development. Scattered small gullies which begin on the upper portions of the slope converge and deepen on the steeper side hills. Bare spots on the study site show obvious soil movement in the past around pedestaled shrubs and bunch grasses. The bunchy nature of the Salina wildrye, which is common on the site, allows a rather large amount of bare soil to be exposed to erosion.

The dominant browse species is mountain big sagebrush. It currently (‘99) makes up 83% of the browse cover. The rather small matured plants show good vigor with moderate use. The population has remained at a stable density of about 3,100 plants/acre since 1994. Percent decadence has steadily increased from 22% in 1988, to 23% in 1994, and 30% by 1999. This is still relatively low, but recruitment is marginal and the proportion of the population that are dead has increased from 8% in 1994 to 17% by 1999. Some additional forage is available from species like low rabbitbrush, snowberry, and gray horsebrush, which show light hedging.

The herbaceous understory is abundant and diverse. Large bunches of Salina wildrye dominant the grass component. It provided 84% of the grass cover in 1994 and 51% in 1999. Associated grass species are mutton and Sandberg bluegrass, slender wheatgrass, and Carex. Twenty-three forb species were identified in 1994 and 26 in 1999. Desert phlox, looseflower milkvetch, silvery lupine, narrowleaf Indian paintbrush, and a penstemon are the most common species. Some of these forbs showed light use in 1999.

1994 TREND ASSESSMENT

Ground cover characteristics changed only slightly since 1988. Bare ground is nearly the same with only a slight increase. Litter has decreased, while rock and pavement have increased. There appears to be ample litter and vegetative cover, with the soil trend appearing stable. Mountain big sagebrush is the key browse. It exhibits a stable mature population. The small stature of the mountain big sagebrush may indicate that the site is marginal for this plant. There is a decrease in the number of seedling and young plants compared to 1988, but this is likely due to a lack of precipitation rather a declining trend. The number of decadent plants has stayed relatively stable with more of the plants being moderately hedged. Trend for browse is stable. Herbaceous understory shows a decrease in sum of nested frequency for both grasses and forbs. Many of the grasses and forbs have significantly decreased in sum of nested frequency since 1988, which would indicate a slightly downward trend.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - slightly down

1999 TREND ASSESSMENT

Trend for soil continues to be stable. Percent cover of litter declined slightly since 1994, but percent bare ground also declined. Vegetation cover increased and herbaceous plants have a stable sum of nested frequency. Trend for the key browse species, mountain big sagebrush, is stable. Population density has remained similar, although use is heavier and percent decadence has increased from 23% to 30%. Recruitment is marginal and there is just enough young plants to replace decadent & dying plants. The proportion of dead plants in the population has increased from 8% to 17% since 1994. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has gone done slightly, while frequency of perennial forbs increased slightly. Nested frequency of Salina wildrye declined significantly since 1994, but frequency of the more preferred slender wheatgrass increased significantly. Cover of perennial grasses increased from 9% to 10%, with forb cover more than doubling (7.4% to 16.7%) since 1994. Currently forbs provide 62% of the herbaceous cover.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 18

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron trachycaulum	$_{b}$69	$_{a}$13	$_{b}$44	31	5	22	.02	.55
G	Bromus anomalus	$_{b}$12	$_{a}$-	$_{b}$7	4	-	4	-	.09
G	Bromus japonicus (a)	-	-	-	-	-	-	-	.00
G	Carex spp.	24	18	37	11	8	16	.38	1.39
G	Elymus salina	$_{a}$115	$_{b}$167	$_{a}$115	49	63	45	7.71	5.26
G	Oryzopsis hymenoides	-	-	2	-	-	1	-	.00
G	Poa fendleriana	68	80	63	30	32	26	.89	2.28
G	Poa secunda	$_{b}$92	$_{a}$24	$_{a}$13	37	13	5	.06	.02
G	Stipa lettermani	15	7	14	8	3	6	.07	.69
Total for Annual Grasses		0	0	0	0	0	0	0	0.00
Total for Perennial Grasses		395	309	295	170	124	125	9.14	10.31
Total for Grasses		395	309	295	170	124	125	9.14	10.31
F	Androsace septentrionalis (a)	-	9	14	-	3	6	.30	.05
F	Arabis spp.	$_{b}$7	$_{a}$-	$_{ab}$3	5	-	2	-	.01
F	Astragalus convallarius	-	3	5	-	1	3	.00	.01
F	Astragalus megacarpus	9	1	4	6	1	2	.00	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	‰94	‰99
F	Astragalus tenellus	$_{a}$26	$_{a}$13	$_{b}$48	12	8	24	.72	3.22
F	Aster spp.	-	-	2	-	-	1	-	.00
F	Caulanthus crassicaulis	$_{b}$5	$_{a}$-	$_{a}$-	3	-	-	-	-
F	Castilleja linariaefolia	88	59	79	42	31	38	.45	3.53
F	Chaenactis douglasii	17	4	13	9	3	7	.01	.08
F	Comandra pallida	$_{a}$3	$_{a}$2	$_{b}$14	1	1	5	.01	.12
F	Crepis acuminata	1	-	-	1	-	-	-	-
F	Eriogonum alatum	$_{a}$-	$_{b}$11	$_{b}$10	-	5	5	.08	.24
F	Erigeron spp.	12	6	-	6	3	-	.01	-
F	Eriogonum spp.	-	-	1	-	-	1	-	.00
F	Erigeron pumilus	-	-	3	-	-	1	-	.00
F	Eriogonum racemosum	-	-	2	-	-	1	-	.03
F	Eriogonum umbellatum	14	17	16	7	5	8	.07	.40
F	Hymenoxys acaulis	-	-	2	-	-	1	-	.03
F	Hymenoxys richardsonii	$_{a}$39	$_{b}$94	$_{a}$34	19	41	17	1.32	.58
F	Ipomopsis aggregata	$_{b}$9	$_{a}$-	$_{ab}$1	5	-	1	-	.00
F	Lesquerella alpina	$_{a}$11	$_{ab}$20	$_{b}$35	6	11	14	.10	.22
F	Linum lewisii	5	10	12	3	4	6	.02	.08
F	Lupinus sericeus	$_{b}$71	$_{a}$32	$_{a}$42	35	14	21	1.83	3.08
F	Machaeranthera canescens	-	5	5	-	2	2	.01	.06
F	Machaeranthera grindelioides	11	4	3	6	2	2	.04	.03
F	Penstemon spp.	$_{a}$23	$_{a}$10	$_{b}$38	11	5	22	.06	1.39
F	Penstemon watsonii	$_{b}$13	$_{b}$14	$_{a}$-	9	8	-	.16	-
F	Phlox austromontana	$_{b}$160	$_{a}$108	$_{a}$108	67	45	49	2.11	3.28
F	Phlox longifolia	$_{c}$42	$_{b}$10	$_{a}$-	17	5	-	.02	-
F	Senecio multilobatus	11	1	8	6	1	5	.00	.02
F	Taraxacum officinale	8	2	7	4	1	4	.00	.07
F	Tragopogon dubius	1	2	-	1	1	-	.00	-
Total for Annual Forbs		0	9	14	0	3	6	0.30	0.05
Total for Perennial Forbs		586	428	495	281	198	242	7.10	16.60
Total for Forbs		586	437	509	281	201	248	7.41	16.65

Values with different subscript letters are significantly different at ‰ = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 18

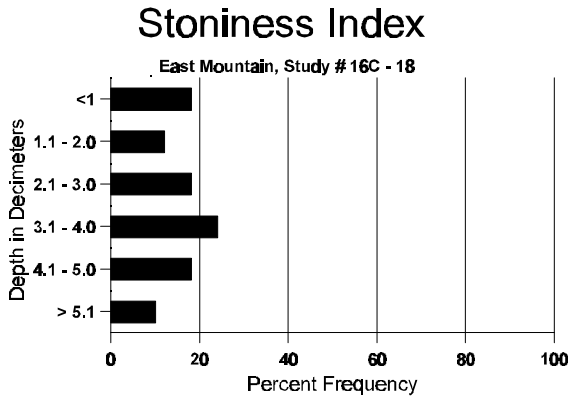
Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Artemisia frigida	19	16	.08	.43
B	Artemisia tridentata vaseyana	68	71	13.11	15.06
B	Chrysothamnus viscidiflorus	53	38	.65	.34
B	Gutierrezia sarothrae	28	23	.37	.43
B	Rosa woodsii	0	1	-	-
B	Symphoricarpos oreophilus	21	22	1.24	.52
B	Tetradymia canescens	25	30	1.64	1.42
Total for Browse		214	201	17.10	18.23

BASIC COVER --
Herd unit 16C, Study no: 18

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	299	304	10.75	31.36	37.50
Rock	150	82	2.50	5.98	8.07
Pavement	144	128	0	1.34	1.92
Litter	387	343	45.25	34.56	29.52
Cryptogams	21	9	0	.43	.09
Bare Ground	334	304	41.50	43.59	35.87

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 18, Study Name: East Mountain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
17.4	48.8 (17.3)	7.3	40.0	27.4	32.6	2.8	3.8	99.2	0.6



PELLET GROUP DATA --
Herd unit 16C, Study no: 18

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	20	10	n/a
Elk	36	24	55 (136)
Deer	2	4	17 (42)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 18

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia frigida																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	88	2	1	-	-	-	-	-	-	-	3	-	-	-	200	4	2	3
	94	23	-	-	2	-	-	-	-	-	25	-	-	-	500	5	4	25
	99	21	-	-	5	-	-	-	-	-	26	-	-	-	520	5	7	26
D	88	-	-	1	-	-	-	-	-	-	-	-	1	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	25%	25%	25%	+53%
'94	00%	00%	00%	+15%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	266	Dec:	25%
'94	560		0%
'99	660		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	1	-	-	1	-	-	-	-	-	2	-	-	-	133			2
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
Y	88	12	7	-	-	-	-	-	-	-	14	5	-	-	1266			19
	94	6	1	-	1	-	-	-	-	-	8	-	-	-	160			8
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	88	19	11	1	-	-	-	-	-	-	30	1	-	-	2066	13	31	31
	94	71	34	2	3	-	-	-	-	-	110	-	-	-	2200	15	32	110
	99	21	65	10	-	3	-	-	-	-	92	-	7	-	1980	16	33	99
D	88	6	6	2	-	-	-	-	-	-	8	5	1	-	933			14
	94	7	28	-	-	-	-	-	-	-	24	-	-	11	700			35
	99	15	24	5	-	3	-	-	-	-	38	-	-	9	940			47
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	680			34

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	38%	05%	02%	-28%
'94	41%	01%	07%	+ 3%
'99	61%	10%	10%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	4265	Dec:	22%
	'94	3060		23%
	'99	3140		30%

Chrysothamnus viscidiflorus																		
S	88	3	-	1	1	-	-	-	-	-	5	-	-	-	333			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	10	3	-	1	-	-	-	-	-	12	2	-	-	933			14
	94	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
	99	13	-	-	1	-	-	-	-	-	14	-	-	-	280			14
M	88	11	2	2	-	-	-	-	-	-	15	-	-	-	1000	5	5	15
	94	110	-	-	8	-	-	-	-	-	118	-	-	-	2360	7	9	118
	99	53	-	-	1	-	1	-	-	-	55	-	-	-	1100	7	11	55
D	88	2	3	3	-	-	-	-	-	-	8	-	-	-	533			8
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	1	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	22%	14%	00%	- 2%
'94	00%	00%	00%	-40%
'99	00%	01%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	2466	Dec:	22%
	'94	2420		0%
	'99	1460		5%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	66	-	-	-	-	-	-	-	-	66	-	-	-	1320	6	6	66
	99	55	-	-	1	-	-	-	-	-	56	-	-	-	1120	7	8	56
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	-16%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	1480		8%
	'99	1240		0%

Rosa woodsii																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	18	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	12	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	60		-

Symphoricarpos oreophilus																		
S	88	2	-	-	-	-	-	1	-	-	3	-	-	-	200			3
	94	1	-	-	-	-	-	2	-	-	3	-	-	-	60			3
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	88	8	1	-	-	-	-	-	-	-	9	-	-	-	600			9
	94	19	-	-	7	-	-	-	-	-	26	-	-	-	520			26
	99	12	2	-	1	-	-	-	-	-	15	-	-	-	300			15
M	88	2	1	-	-	-	-	-	-	-	3	-	-	-	200	13	21	3
	94	22	8	-	5	-	-	-	-	-	35	-	-	-	700	10	20	35
	99	16	15	-	-	-	-	-	-	-	31	-	-	-	620	11	26	31
D	88	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	6	1	-	-	-	-	-	-	-	7	-	-	-	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	23%	00%	00%	+30%
'94	15%	00%	00%	-15%
'99	34%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	866	Dec:	8%
	'94	1240		2%
	'99	1060		13%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	8	-	-	1	-	-	-	-	-	9	-	-	-	180			9
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	65	-	-	1	-	-	-	-	-	66	-	-	-	1320	7	11	66
	99	35	10	-	-	-	-	-	-	-	45	-	-	-	900	8	11	45
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
	99	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	01%	-22%
'99	18%	00%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	1440		4%
	'99	1120		4%

Trend Study 16C-19-99

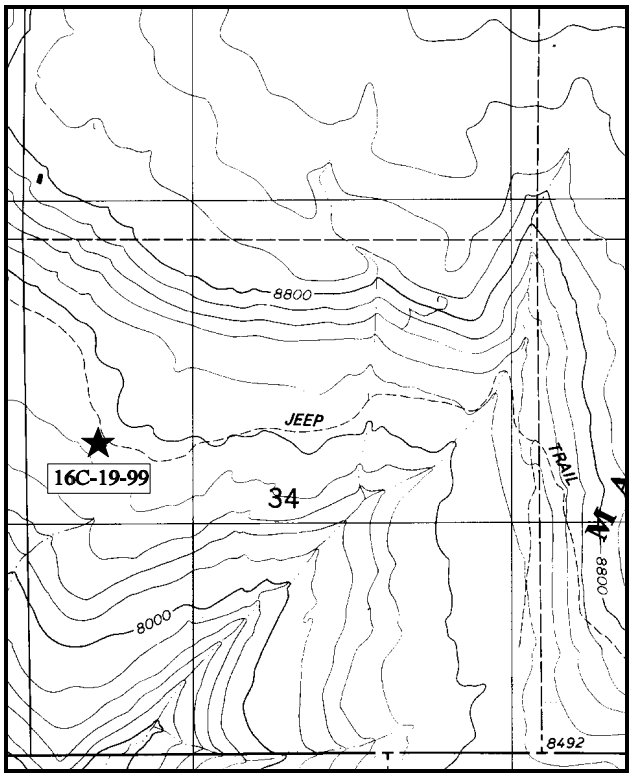
Study site name: Trail Mountain Exclosure . Range type: Mixed Mountain Brush .

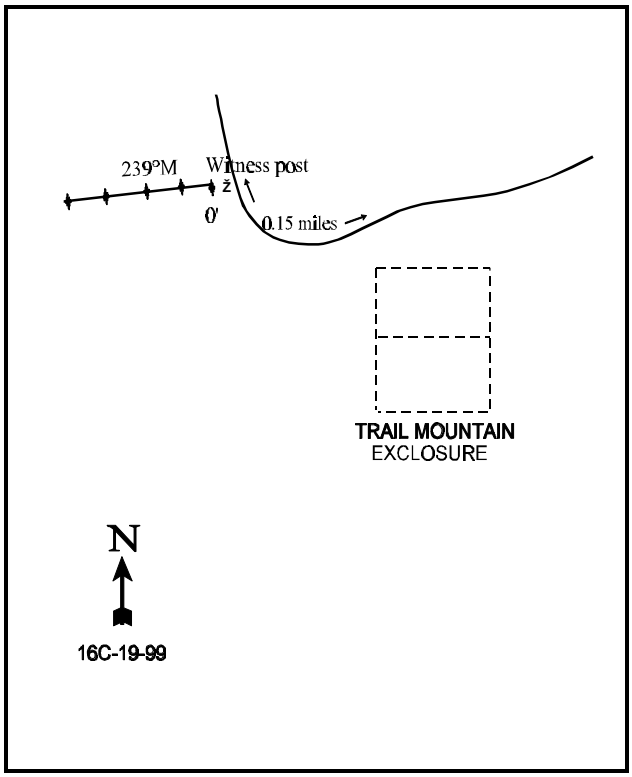
Compass bearing: frequency baseline 239°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the pass between Upper Joes Valley and the head of Cottonwood Creek (Tl6S, R6E, sec 27), take the road south onto Trail Mountain. Go 7.0 miles on this road to a fork. Take the left fork, towards Miles Point. Go 4.25 miles to a fork. Bear right down the side of the mountain for 1.35 miles. Bear right at another fork and continue l.0 miles to the exclosure. Continue past the exclosure for 0.15 miles to just past where the road crosses a gully at a sharp bend in the terraces to a witness post. The 0 ft stake is located 13 paces away at 225°M, and is marked with a browse tag. There is rebar next to the 0 ft stake.





Map Name: Mahogany Point Diagrammatic Sketch

Township 17S , Range 6E , Section 34 UTM 4350364.583 N, 479671.097 E

DISCUSSION

Trend Study No. 16C-19 (31-17)

The Trail Mountain Big Game Exclosure was constructed on the southwest end of Trail Mountain in the 1960's. Considerable watershed work, contour trenching and seeding, was done on this Forest Service land at that time. The area has since been closed to livestock grazing, although there is occasionally trespass by cattle. This side of the mountain is occupied by a mixed mountain brush range type. The trend study is on the same location as the 1980 line-intercept study #35-3. It starts near a sharp bend in a large contour furrow above an old gully. The bench has a gentle slope, but drops off steeply to the west and south. The aspect is south-southwest and the elevation is 8,350 feet. Sign of deer and elk winter use is scattered. Pellet group data from the site in 1999 estimated 15 deer, 44 elk, and 8 cow days use/acre (37 ddu/ha, 109 edu/ha, and 20 cdu/ha). Most of the deer and elk pellet groups were from winter use. Most of the cow pats encountered were old, however some fresh pats were observed on the site.

The soil is a moderately deep, clay loam with a slightly alkaline pH (7.6). Like all of the other sites in the unit, the soil here is deficient in phosphorus at just 2.9 ppm. Values less than 10 ppm can inhibit normal plant growth and development. Effective rooting depth was estimated at almost 14 inches. Soil pentrometer readings were limited by a heavy compacted soil horizon. This is not apparently a continuous rooting barrier due to the abundance of deeper rooted shrubs on the site. A large gully by the site is vegetated and stable. Litter and vegetation is abundant and the contour trenches remain effective in slowing erosion.

The mixed brush type on this site is composed largely of mountain big sagebrush with a significant population of serviceberry and true mountain mahogany. Other common species include dwarf rabbitbrush, snowberry, curlleaf mountain mahogany, and a few antelope bitterbrush. Mountain big sagebrush provided 51% of the browse cover in 1994 and 38% in 1999. It has displayed light to moderate use since 1988 with a few individuals heavily browsed. Vigor is generally good and percent decadence has declined from a high of 50% in 1988, to 16% in 1999. Recruitment currently good with a biotic potential of 11% and young plants comprising 27% of the population. There is also a small population of moderately utilized black sagebrush on the site.

The palatable Utah serviceberry currently (‘99) show moderate to heavy use on available plants. In 1999, some of the large serviceberry plants in the vicinity appear to have been knocked down in what appeared to be a mechanical treatment to promote more available growth. Several shrubs; curlleaf mountain mahogany, and true mountain mahogany, were sampled for the first time on the site in 1994, due to the greatly increased sample size. True mountain mahogany shows heavy use, while curlleaf mahogany displays moderate use. Population densities for these species are low yet they are important forage species. Many of the curlleaf mountain mahogany are large highlined trees. Density of true mountain mahogany is higher in 1999 due to a realignment of the study site baseline. This is a marginal site for mountain mahogany since it is at its upper elevational range.

Native species such as mutton bluegrass, Salina wildrye, Letterman needlegrass, and bluebunch wheatgrass comprise the bulk of the herbaceous understory, except for the terraces where smooth brome and other introduced species are found. A wide variety of forbs were encountered which produced as much cover as the grasses in 1999. However, most species provide little forage due to their low growing growth form.

1994 TREND ASSESSMENT

Litter cover on the site has decreased by 35% since 1988 although bare ground has stayed nearly the same. Trend for soil is stable. Mountain big sagebrush offers the most browse forage and has a stable mature population with a large decrease in percent decadency. Utah serviceberry shows good recruitment with a decline in percent decadency as well. Trend for browse is currently stable. The herbaceous understory trend

is slightly down. Summed nested frequency for grasses and forbs have declined with many species significantly declining.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - slightly down

1999 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1994. Trend for browse is considered stable. Key species, serviceberry, mountain big sagebrush, and true mountain mahogany appear to be relatively stable. Some of the changes in density of mahogany is due to a realignment of the study site baseline in 1999. Utilization of these shrubs is heavier compared to 1994, but vigor is generally good and percent decadence low. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses and forbs increased slightly. Cover also increased slightly for grasses and significantly for forbs (up 60%). The nearby 3 way exclosure visually has a lot more Indian paintbrush in the total and livestock exclosure compared to outside. Grass abundance appears to be higher in the total exclosure than in the livestock exclosure or outside.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 19

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron cristatum	-	-	2	-	-	1	-	.15
G	Agropyron intermedium	7	1	4	4	1	2	.00	.01
G	Agropyron spicatum	61	60	84	26	20	37	1.59	1.99
G	Agropyron trachycaulum	-	1	-	-	1	-	.03	-
G	Bromus inermis	32	26	38	11	10	12	.46	.91
G	Carex spp.	-	1	2	-	1	2	.00	.03
G	Elymus salina	a79	a78	127	32	33	45	1.92	3.73
G	Oryzopsis hymenoides	a-	b13	ab2	-	5	1	.59	.38
G	Poa fendleriana	c173	b134	a77	72	52	30	4.10	2.00
G	Sitanion hystrix	-	5	7	-	3	2	.01	.06
G	Stipa comata	-	-	4	-	-	1	-	.03
G	Stipa lettermani	60	63	53	24	27	23	.89	.92
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		412	382	400	169	153	156	9.63	10.23
Total for Grasses		412	382	400	169	153	156	9.63	10.23

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
F	Antennaria parvifolia	25	12	10	11	9	5	.29	.36
F	Androsace septentrionalis (a)	-	-	3	-	-	1	-	.00
F	Arabis spp.	$_{b}$12	$_{a}$-	$_{a}$-	6	-	-	-	-
F	Astragalus calycosus	$_{a}$-	$_{ab}$1	$_{b}$6	-	1	4	.00	.22
F	Aster chilensis	-	3	-	-	2	-	.01	-
F	Astragalus convallarius	$_{a}$-	$_{b}$6	$_{a}$-	-	3	-	.01	-
F	Astragalus tenellus	$_{c}$25	$_{b}$12	$_{a}$-	13	5	-	.22	-
F	Aster spp.	$_{b}$43	$_{a}$20	$_{ab}$26	19	7	9	.08	.31
F	Castilleja linariaefolia	11	7	17	4	4	10	.16	.35
F	Calochortus nuttallii	$_{b}$7	$_{a}$-	$_{a}$-	3	-	-	-	-
F	Cirsium spp.	6	3	2	4	2	1	.03	.15
F	Comandra pallida	34	28	41	16	12	19	.13	.44
F	Crepis acuminata	$_{b}$4	$_{a}$-	$_{a}$-	3	-	-	-	-
F	Eriogonum alatum	-	1	2	-	1	1	.01	.03
F	Erigeron eatonii	$_{b}$52	$_{a}$2	$_{a}$8	25	1	3	.00	.01
F	Eriogonum umbellatum	$_{a}$17	$_{b}$41	$_{b}$43	7	19	19	.77	1.75
F	Hedysarum boreale	$_{ab}$3	$_{a}$-	$_{b}$6	1	-	3	-	.09
F	Hymenoxys acaulis	10	5	4	4	3	2	.06	.06
F	Ipomopsis aggregata	$_{a}$-	$_{a}$-	$_{b}$6	-	-	3	-	.04
F	Lesquerella spp.	7	2	4	3	2	2	.01	.03
F	Lupinus spp.	$_{b}$50	$_{a}$-	$_{a}$-	21	-	-	-	-
F	Machaeranthera canescens	$_{a}$10	$_{a}$7	$_{b}$40	5	3	19	.06	.83
F	Machaeranthera grindelioides	$_{a}$-	$_{b}$4	$_{a}$-	-	3	-	.06	-
F	Orthocarpus spp. (a)	-	-	2	-	-	1	-	.15
F	Penstemon caespitosus	131	143	126	56	60	48	3.50	4.37
F	Pedicularis centranthera	$_{a}$-	$_{a}$-	$_{b}$12	-	-	5	-	.15
F	Penstemon spp.	$_{b}$41	$_{ab}$6	$_{a}$-	17	2	-	.06	-
F	Penstemon pachyphyllus	4	-	7	2	-	2	-	.03
F	Phlox austromontana	$_{b}$116	$_{a}$80	$_{a}$63	56	37	32	1.06	.97
F	Potentilla gracilis	-	16	26	-	7	12	.06	.16
F	Senecio multilobatus	$_{b}$15	$_{a}$1	$_{ab}$6	8	1	4	.00	.07
F	Taraxacum officinale	4	-	-	2	-	-	-	-
F	Unknown forb-perennial	$_{b}$7	$_{a}$-	$_{a}$-	6	-	-	-	-
F	Zigadenus paniculatus	1	-	-	1	-	-	-	-
Total for Annual Forbs		0	0	5	0	0	2	0	0.15
Total for Perennial Forbs		635	400	455	293	184	203	6.63	10.46
Total for Forbs		635	400	460	293	184	205	6.63	10.61

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 19

Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Amelanchier utahensis	27	22	3.47	2.79
B	Artemisia nova	12	8	.51	.94
B	Artemisia tridentata vaseyana	76	65	10.94	9.55
B	Ceratoides lanata	0	0	-	-
B	Cercocarpus ledifolius	7	8	1.38	.03
B	Cercocarpus montanus	14	16	1.13	3.36
B	Chrysothamnus depressus	26	27	1.24	.66
B	Chrysothamnus nauseosus	14	1	.13	-
B	Chrysothamnus viscidiflorus	10	16	.69	.55
B	Eriogonum microthecum	-	-	-	.03
B	Gutierrezia sarothrae	6	22	.06	1.13
B	Juniperus osteosperma	0	0	-	-
B	Leptodactylon pungens	0	0	-	-
B	Opuntia spp.	-	-	.03	-
B	Pinus edulis	0	1	.03	.15
B	Purshia tridentata	1	3	.15	.30
B	Sambucus cerulea	0	0	-	.00
B	Symphoricarpos oreophilus	20	30	1.39	5.60
B	Tetradymia canescens	15	10	.09	.01
Total for Browse		228	229	21.28	25.14

CANOPY COVER --
Herd unit 16C, Study no: 19

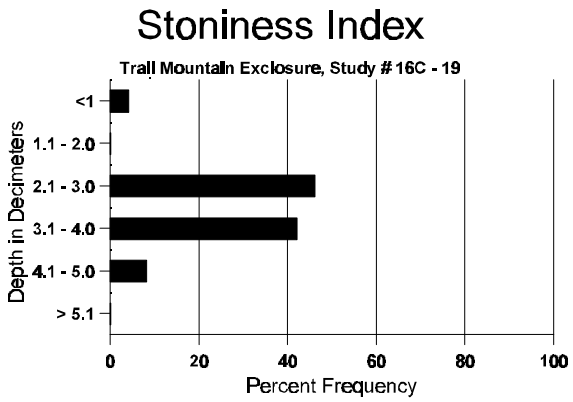
Species	Percent Cover '99
Cercocarpus ledifolius	2

BASIC COVER --
Herd unit 16C, Study no: 19

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	306	327	9.00	34.87	40.61
Rock	165	106	0	3.90	6.11
Pavement	78	188	2.25	1.14	3.62
Litter	350	353	59.00	38.39	37.47
Cryptogams	14	21	1.00	.27	.31
Bare Ground	272	259	28.75	28.70	23.38

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 19, Study Name: Trial Mountain Exclosure

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.9	52.8 (15.0)	7.6	38.7	27.4	33.8	3.0	2.9	131.2	0.5



PELLET GROUP DATA --
Herd unit 16C, Study no: 19

Type	Quadrat Frequency '94	Quadrat Frequency '99
Rabbit	16	10
Elk	12	20
Deer	17	7
Cattle	1	1

Pellet Transect Days Use/Acre (ha) '99
n/a
44 (109)
15 (37)
8 (20)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 19

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	88	-	-	-	1	-	-	1	-	-	2	-	-	-	133			2
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	2	3	-	-	-	-	-	-	-	4	-	-	1	333			5
	94	20	-	-	2	-	-	1	-	-	23	-	-	-	460			23
	99	8	1	-	-	-	-	-	-	-	9	-	-	-	180			9
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	11	4	2	-	1	-	5	-	-	21	-	2	-	460	27	29	23
	99	5	13	4	-	2	1	-	-	-	25	-	-	-	500	38	44	25
D	88	-	-	-	-	1	-	-	-	-	1	-	-	-	66			1
	94	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	2	-	-	1	1	-	-	-	-	-	4	80			4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	67%	00%	17%	+58%
'94	10%	04%	04%	-21%
'99	42%	21%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	399	Dec:		17%
'94	960			4%
'99	760			11%

Artemisia nova																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	2	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	10	1	-	1	-	-	-	-	-	12	-	-	-	240	11	20	12
	99	7	10	-	-	-	-	-	-	-	17	-	-	-	340	9	19	17
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	10	4	1	-	-	-	-	-	-	9	-	-	6	300			15
	99	1	-	-	-	-	-	1	-	-	-	-	-	2	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11
	99	-	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	19%	04%	22%	-22%
'99	57%	00%	10%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		0%
'94	540			56%
'99	420			10%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	6	-	-	-	-	-	5	-	-	11	-	-	-	733			11
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	21	-	-	-	-	-	1	-	-	22	-	-	-	440			22
Y	88	5	-	-	1	-	-	1	-	-	7	-	-	-	466			7
	94	21	-	-	1	-	-	-	-	-	22	-	-	-	440			22
	99	40	1	-	-	-	-	-	-	-	41	-	-	-	820			41
M	88	15	10	2	-	-	-	-	-	-	27	-	-	-	1800	22	28	27
	94	98	1	-	4	-	-	-	-	-	103	-	-	-	2060	19	26	103
	99	46	27	12	1	1	-	-	-	-	86	1	-	-	1740	22	27	87
D	88	14	19	1	-	-	-	-	-	-	34	-	-	-	2266			34
	94	35	4	2	3	-	-	-	-	-	32	-	-	12	880			44
	99	15	8	1	-	-	-	-	-	-	14	-	-	10	480			24
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	600			30
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	580			29

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	43%	04%	00%	-25%
'94	03%	01%	07%	-10%
'99	24%	09%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	4532	Dec:	50%
	'94	3380		26%
	'99	3040		16%

Ceratoides lanata																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	3	3	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	265	Dec:	50%
	'94	0		0%
	'99	0		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus ledifolius																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	99	4	2	-	-	1	-	-	-	-	7	-	-	-	140			7
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	3	-	1	-	-	-	-	-	5	-	-	-	100	20	21	5
	99	-	2	-	-	-	-	-	-	-	2	-	-	-	40	26	27	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	43%	00%	00%	+22%
'99	56%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	140		-
	'99	180		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus montanus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	3	-	-	-	-	-	5	-	-	-	100			5
	99	-	4	-	-	-	-	-	-	-	4	-	-	-	80			4
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	4	6	2	-	-	-	-	-	13	-	-	-	260	24	29	13
	99	-	-	12	-	10	8	-	-	-	27	3	-	-	600	22	32	30
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	1	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	21%	37%	05%	+44%
'99	41%	59%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	380		5%
	'99	680		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	30	15	1	-	-	-	-	-	-	46	-	-	-	3066	4	9	46
	94	74	26	-	2	-	-	-	-	-	102	-	-	-	2040	3	7	102
	99	9	12	41	-	-	5	-	-	-	65	2	-	-	1340	2	7	67
D	88	4	1	-	-	-	-	-	-	-	5	-	-	-	333			5
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	30%	02%	00%	-41%
'94	25%	00%	.94%	-36%
'99	19%	68%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	3599	Dec:	9%
	'94	2120		1%
	'99	1360		1%

Chrysothamnus nauseosus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	18	1	-	1	-	-	-	-	-	20	-	-	-	400	6	9	20
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	15	0
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	2	-	-	-	-	-	-	-	-	2	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	04%	00%	09%	-91%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	460		9%
	'99	40		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	88	8	-	-	-	-	-	-	-	-	8	-	-	-	533	6	7	8
	94	9	-	-	4	-	-	-	-	-	13	-	-	-	260	5	9	13
	99	42	1	-	-	-	-	-	-	-	43	-	-	-	860	6	7	43
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	2	-	-	-	-	-	-	-	-	-	2	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-44%
'94	00%	13%	13%	+68%
'99	02%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	533	Dec:		0%
'94	300			13%
'99	940			0%

Gutierrezia sarothrae																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	7	-	-	1	-	-	-	-	-	8	-	-	-	160	5	6	8
	99	55	-	-	-	-	-	-	-	-	55	-	-	-	1100	6	8	55
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+87%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	160			-
'99	1240			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	69	72	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	66	Dec:		-
'94	0			-
'99	0			-

Leptodactylon pungens																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	4	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	0			-

Pinus edulis																		
S	88	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	2	-	1	-	60			3
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	20			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9	32	1
	99	-	-	1	-	-	2	-	-	-	3	-	-	-	60	7	15	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+75%
'99	00%	75%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	20			-
'99	80			-

Sambucus cerulea																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	24	33	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	32	31	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	0			-

Symphoricarpos oreophilus																		
S	88	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	10	-	-	3	-	-	-	-	-	13	-	-	-	260			13
	99	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	19	1	-	5	-	-	-	-	-	25	-	-	-	500	13	25	25
	99	40	4	-	-	-	-	-	-	-	44	-	-	-	880	14	28	44
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	03%	00%	00%	+38%
'99	07%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		0%
'94	760			0%
'99	1220			3%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
Y	88	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	1	-	1	-	-	-	-	-	2	-	-	-	133	12	7	2
	94	11	3	-	-	1	-	-	-	-	15	-	-	-	300	5	8	15
	99	7	6	-	-	-	-	-	-	-	13	-	-	-	260	6	9	13
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	1	3	-	-	-	-	-	-	4	-	-	-	80			4
	99	1	1	-	-	3	-	-	-	-	3	-	-	2	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	33%	00%	00%	+55%
'94	23%	14%	00%	-18%
'99	56%	00%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	199	Dec:	0%
'94	440		18%
'99	360		28%

Trend Study 16C-20-99

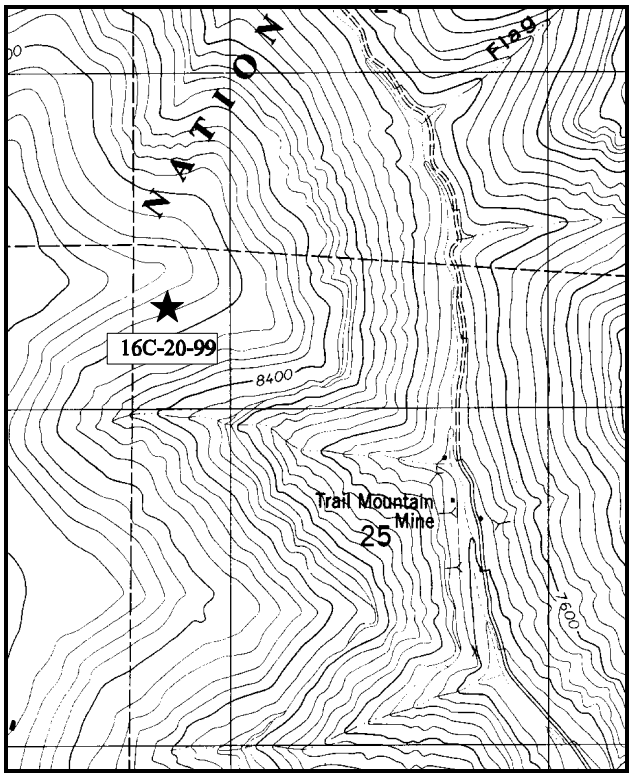
Study site name: Miles Point . Range type: Big Sagebrush-Grass .

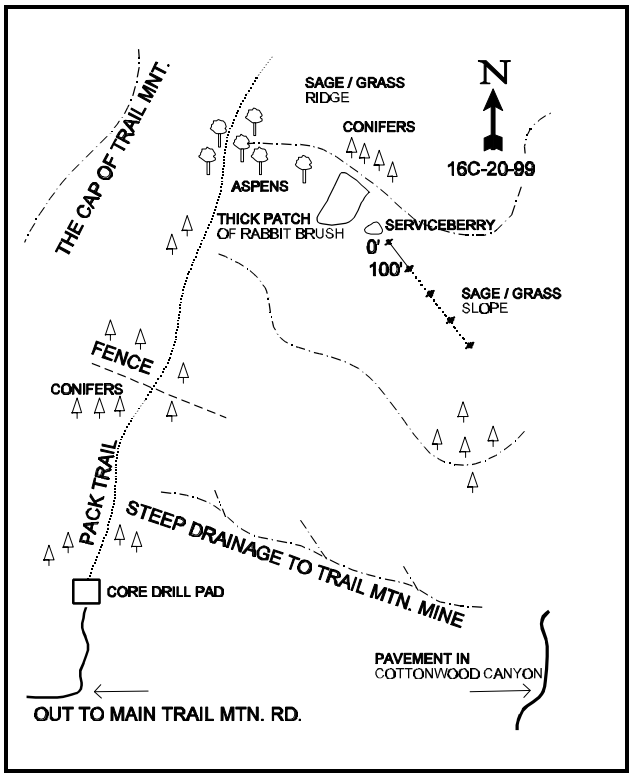
Compass bearing: frequency baseline 112°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the pass at the top of the Cottonwood Canyon Road (10.15 miles from Straight Canyon), take the Trail Mountain road southeast for approximately 9.5 miles to the south end of the Cap of Trail Mountain. The study site is to the NE, on the other side of this high cap. A new road takes off to the east from the main road just past the southern point of the cap. Follow this road for 0.65 miles and stop before you enter the thick timber. From here, a pack trail takes off to the north along the edge of Trail Mountain. Follow this trail for about 1/2 miles to an open ridge. Turn east and hike down this ridge to the SE for 1/4 mile. The study is located on a sage-grass slope on the SE side of the ridge. The 0-foot baseline stake, marked by browse tag #9030, is adjacent to a large clump of serviceberry. The area has a view of lower Cottonwood Canyon and the fields in Straight Canyon.





Map Name: Mahogany Point Diagrammatic Sketch

Township 17S , Range 6E ,Section 25

DISCUSSION

Trend Study No. 16C-20 (31-18)

This study is not actually situated on Miles Point, but on a similar sagebrush/grass point above the Trail Mountain mine in Cottonwood Canyon. It samples a typical high elevation elk winter range, which mule deer use in the summer. The study is on a moderately steep slope (35%) with a southeast aspect. The elevation is 8,800 feet. There is moderate elk sign on the open, south-facing ridge. Nearby aspen, curlleaf mountain mahogany, and conifer stands also show evidence of elk winter use. The study site is in the Trail Mountain summer cattle allotment, but actually receives little use by cattle. Pellet group data from 1999 estimate 3 deer, 70 elk, and 2 cow days use/acre (7 ddu/ha, 173 edu/ha, and 5 cdu/ha). Nearly all of the elk pellet groups were from the previous winter, although a few were more recent. Cattle pats were old.

Soil on the site is moderately deep with an effective rooting depth estimated at almost 17 inches. Soil texture is a clay loam with a slightly alkaline pH (7.5). Phosphorus levels are marginal at 6 ppm because values less than 10 ppm can limit normal plant growth and development. Soil parent material is limestone with rocks common within the profile. Vegetative and litter cover is adequate to protect the soil on the slope from excessive movement, but some soil pedestaling and terracing is evident. On the downhill side of terraces there are some plant roots exposed. The abundant grasses provide over half of vegetative cover. Litter is also abundant. Rocks and pavement occur in the interspaces leaving little exposed bare soil.

The key browse on the sagebrush/grass slope is the vigorous mountain big sagebrush. Sagebrush cover along the baseline is higher near the zero foot stake and decreases as you reach the 400 foot stake. Sagebrush provided 66% of the browse cover in 1994 and 80% in 1999. The mountain big sagebrush population has shifted from predominantly young plants in 1988 to a more mature stand in 1994 and 1999. Browsing on the sagebrush is light to moderate, vigor is normal and percent decadence relatively low.

Other common shrubs include dwarf rabbitbrush, low rabbitbrush, and snowberry. Dwarf rabbitbrush (*Chrysothamnus depressus*) displays consistent moderate to heavy use since 1988. Vigor is good and percent decadence low. The large decline in density of dwarf rabbitbrush between 1988 and 1994 is mostly due to the much larger sample used in 1994. The scattered Utah serviceberry show light use and good vigor. Snowberry also shows light use with a stable population density, although shifting towards a more mature stand.

Bluebunch wheatgrass and Salina wildrye provide most the herbaceous understory cover due to their large bunchgrass stature. Bluebunch wheatgrass has increased significantly with each reading. Other grass species are uncommon. Grasses showed light utilization overall, but some were moderately utilized in 1999. Forbs are rare with timber poison vetch the only common species.

1994 TREND ASSESSMENT

Bare ground has decreased slightly although there was a decrease in litter cover. Herbaceous vegetative cover is abundant and provides a majority of the ground cover. Trend for soil is stable. The key browse is mountain big sagebrush. It has a low number of seedling and young plants this year, but most of the young sampled in 1988 appear to have survived and are now mature. Utilization is light, although percent decadency has increased. The trend for browse is stable. Summed nested frequency for grasses has increased since 1988. Summed nested frequency for forbs has decreased greatly and is mostly due to one plant, timber poisonvetch. Trend for herbaceous understory is stable.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

1999 TREND ASSESSMENT

Trend for soil continues to be stable due to similar ground cover characteristics compared to 1994. There is some localized soil movement occurring yet the abundance of herbaceous vegetation cover has stabilized the slope. Trend for the key browse, mountain big sagebrush, is stable. Sagebrush density has increased slightly, vigor is normal, and percent decadence has declined slightly. However, utilization is heavier and reproduction is marginally low. In addition, 42% (220 plants/acre) of the decadent plants appear to be dying. Currently, there are enough young plants within the population to replace the decadent & dying sagebrush. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has remained stable while frequency of forbs has increased slightly. Nested frequency of Salina wildrye declined significantly with the more preferred, bluebunch wheatgrass increased significantly. There may have been some confusion in the identification between these two species in 1994.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 20

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	$_{a}$212	$_{b}$234	313	79	80	94	14.05	19.32
G	Elymus salina	$_{a}$64	$_{b}$123	$_{a}$59	28	44	28	8.85	3.98
G	Poa fendleriana	7	12	6	4	6	3	.03	.09
G	Stipa lettermani	$_{b}$21	$_{ab}$15	$_{a}$6	9	6	2	.13	.18
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		304	384	384	120	136	127	23.06	23.57
Total for Grasses		304	384	384	120	136	127	23.06	23.57
F	Androsace septentrionalis (a)	-	-	3	-	-	1	-	.00
F	Astragalus convallarius	$_{b}$147	$_{a}$14	$_{a}$29	61	8	13	.04	.77
F	Aster spp.	2	2	-	1	1	-	.00	-
F	Astragalus spp.	-	-	3	-	-	1	-	.03
F	Castilleja linariaefolia	$_{b}$13	$_{a}$-	$_{a}$-	7	-	-	-	-
F	Calochortus nuttallii	1	2	1	1	1	1	.00	.01
F	Chaenactis douglasii	-	-	5	-	-	2	-	.03
F	Cirsium neomexicanum	2	-	-	1	-	-	-	-
F	Cirsium spp.	2	-	2	1	-	1	-	.03
F	Crepis acuminata	7	-	-	3	-	-	-	-

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Hedysarum boreale	-	-	2	-	-	1	-	.15
F	Hymenoxys richardsonii	-	-	-	-	-	-	.00	.00
F	Machaeranthera canescens	$_{b}$9	$_{a}$2	$_{ab}$4	7	1	2	.00	.06
F	Penstemon caespitosus	-	-	5	-	-	2	-	.06
F	Phlox longifolia	3	-	1	1	-	1	-	.00
F	Tragopogon dubius	4	-	-	1	-	-	-	-
F	Unknown forb-perennial	4	3	-	2	1	-	.00	-
Total for Annual Forbs		0	0	3	0	0	1	0	0.00
Total for Perennial Forbs		194	23	52	86	12	24	0.06	1.15
Total for Forbs		194	23	55	86	12	25	0.06	1.15

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 20

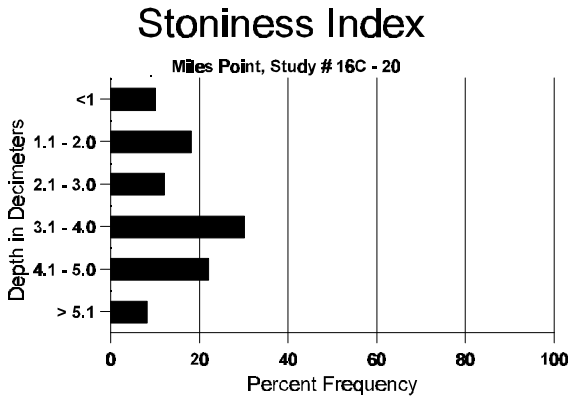
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	2	0	-	-
B	Artemisia tridentata vaseyana	86	85	12.65	15.80
B	Chrysothamnus depressus	12	20	.84	.79
B	Chrysothamnus vaseyi	0	2	-	-
B	Chrysothamnus viscidiflorus	70	66	2.86	1.28
B	Sambucus cerulea	0	1	.15	.15
B	Symphoricarpos oreophilus	39	39	2.54	1.69
B	Tetradymia canescens	7	8	-	-
Total for Browse		216	221	19.06	19.73

BASIC COVER --
Herd unit 16C, Study no: 20

Cover Type	Nested Frequency '94	'99	Average Cover % '88	'94	'99
Vegetation	321	338	13.50	44.13	44.77
Rock	263	157	3.75	7.74	6.75
Pavement	193	212	3.50	1.18	6.38
Litter	385	371	58.75	42.52	43.77
Cryptogams	4	4	0	.03	.18
Bare Ground	259	245	20.50	18.95	16.36

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 20, Study Name: Miles Point

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.9	51.0 (17.0)	7.5	24.7	29.4	45.8	3.1	6.0	128.0	0.5



PELLET GROUP DATA --
Herd unit 16C, Study no: 20

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	11	10	n/a
Elk	31	24	70 (173)
Deer	9	2	3 (7)
Cattle	-	2	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 20

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	33	40	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	36	20	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	40		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	1	-	-	-	-	-	4	-	-	-	100			5
Y	88	19	8	1	-	-	-	-	-	-	28	-	-	-	1866			28
	94	10	-	-	-	-	-	1	-	-	11	-	-	-	220			11
	99	14	2	-	2	-	-	-	-	-	18	-	-	-	360			18
M	88	6	5	-	-	-	-	-	-	-	10	1	-	-	733	22	32	11
	94	103	27	-	-	2	-	-	-	-	132	-	-	-	2640	21	33	132
	99	92	52	2	-	2	-	-	-	-	144	-	4	-	2960	22	32	148
D	88	-	1	2	-	-	-	-	-	-	3	-	-	-	200			3
	94	30	6	1	-	-	-	-	-	-	24	-	-	13	740			37
	99	20	5	-	1	-	-	-	-	-	15	-	-	11	520			26
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	600			30
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	800			40

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	33%	07%	00%	+22%
'94	19%	.55%	07%	+ 6%
'99	32%	01%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	2799	Dec:		7%
'94	3600			21%
'99	3840			14%

Chrysothamnus depressus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	2	2	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	18	27	11	-	-	-	1	-	-	56	-	1	-	3800	3	7	57
	94	23	9	10	-	-	-	-	-	-	42	-	-	-	840	4	8	42
	99	24	11	24	8	-	-	-	-	-	67	-	-	-	1340	4	7	67
D	88	8	1	1	-	-	-	-	-	-	9	-	1	-	666			10
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	2	-	-	-	2	1	-	-	-	2	-	-	3	100			5
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	42%	17%	03%	-81%
'94	20%	22%	00%	+38%
'99	18%	34%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	4732	Dec:		14%
'94	920			9%
'99	1480			7%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus vaseyi																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	29	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	19	25	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	40		-

Chrysothamnus viscidiflorus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	88	22	-	-	-	-	-	-	-	-	22	-	-	-	1466			22
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	16	2	-	-	-	-	-	-	-	18	-	-	-	360			18
M	88	63	-	-	-	-	-	-	-	-	63	-	-	-	4200	10	12	63
	94	201	2	-	26	-	-	2	-	-	229	-	2	-	4620	8	13	231
	99	136	29	-	4	-	-	-	-	-	169	-	-	-	3380	9	11	169
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	99	15	-	-	1	-	-	-	-	-	12	-	-	4	320			16

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-16%
'94	.83%	00%	.83%	-15%
'99	15%	00%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	5666	Dec:	0%
	'94	4780		2%
	'99	4060		8%

Sambucus cerulea																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	30	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	22	24	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	6	4	6	-	-	-	2	-	-	17	-	1	-	1200			18
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	13	-	-	1	-	-	-	-	-	14	-	-	-	280			14
M	88	-	7	2	-	-	-	-	-	-	9	-	-	-	600	13	33	9
	94	44	-	6	13	-	-	11	-	-	74	-	-	-	1480	11	32	74
	99	42	22	-	4	-	-	-	-	-	68	-	-	-	1360	11	23	68
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
	99	1	-	-	3	-	-	-	-	-	2	-	-	2	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	41%	30%	04%	-11%
'94	00%	08%	01%	+ 7%
'99	26%	00%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1800	Dec:		0%
'94	1600			4%
'99	1720			5%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	1	2	1	-	-	-	-	-	-	4	-	-	-	266	7	10	4
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160	9	9	8
	99	10	5	-	-	-	-	-	-	-	15	-	-	-	300	8	9	15
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	40%	20%	00%	-46%
'94	00%	00%	00%	+44%
'99	31%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	332	Dec:		0%
'94	180			11%
'99	320			0%

Trend Study 16C-21-99

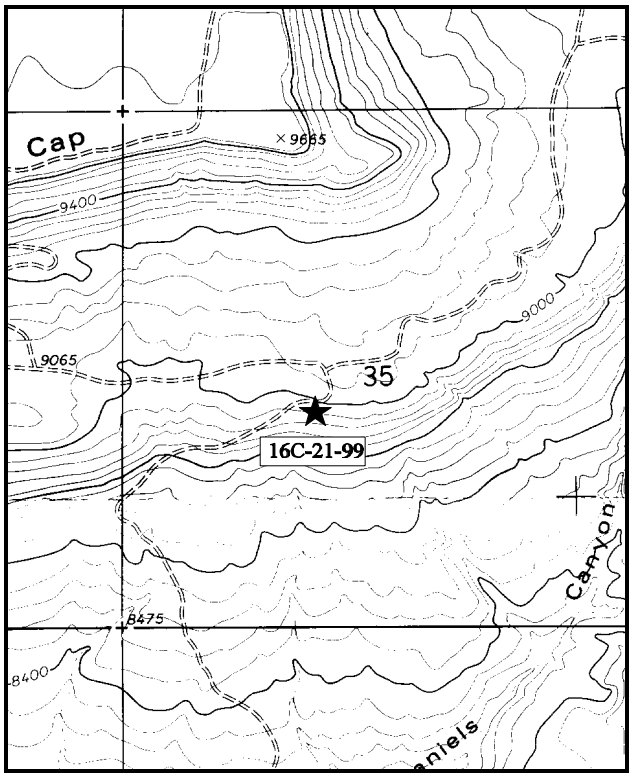
Study site name: North Horn Cap . Range type: Mixed Mountain Brush .

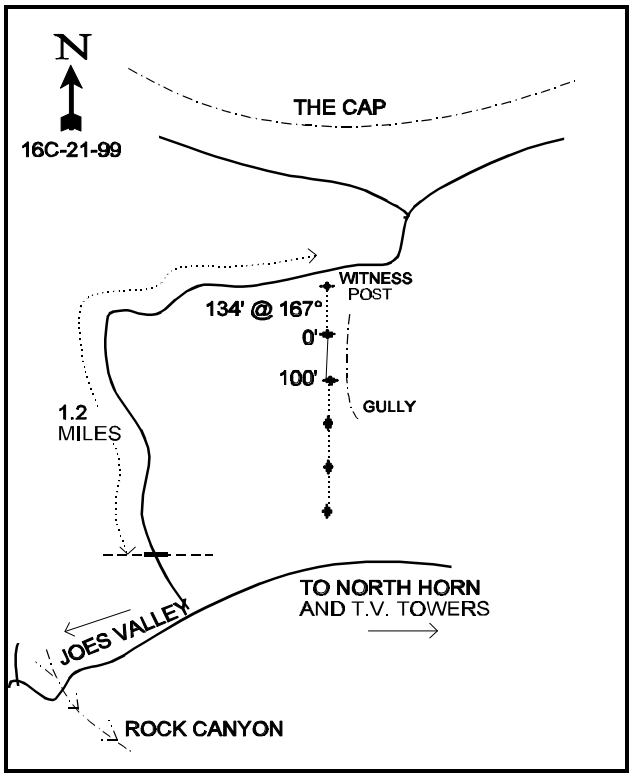
Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Starting on the southwest side of Joes Valley Reservior, follow the main road up North Dragon Creek to a three-way fork at the upper end. Bear left and follow the main road about four miles to an intersection. From the intersection of the North Horn and South Horn roads, continue on the North Horn road towards the Emery County TV towers for 1.3 miles to a fork. Turn left towards The Cap and go 0.2 miles to a cattleguard. Continue up the dugway 1.2 miles to a witness post on the south side of the road. From the witness post, walk down the steep slope 134 feet (167°) to the start of the baseline. The 0-foot stake, a 2' metal fencepost, is marked by browse tag #9017.





Map Name: The Cap , Diagrammatic Sketch

Township 18S , Range 6E , Section 35 UTM 4339979.552 N, 481141.809 E

DISCUSSION

Trend Study No. 16C-21 (31-19)

The North Horn Cap trend study is situated on a moderately steep, southern slope of The Cap of North Horn Mountain. Slope varies from almost 30% to 55%, the overall average would be about 40%. The site overlooks the gentle, chained slopes and sagebrush/grass valley below. Large contoured terraces traverse the entire length of The Cap. A contour trenching and seeding treatment was done by the Forest Service in the 1960's to curb serious soil erosion. The study site runs down slope crossing several terraces. It is classified as a mixed mountain brush range type. The site is on a slope that faces directly south. At 9,000 feet in elevation, the site is generally too high for normal deer winter range but is used by elk and some moose. Cattle graze the area as part of the Horn Mountain Allotment. Cattle use the slope only occasionally, as herbaceous forage for cattle is limited. The very steep character of the slope, which varies from 27% along the 1st 100 feet to 55% along the last 200 feet, has definite effects upon the vegetation and animal use of the site. Pellet group data from 1999 estimate 7 deer, 34 elk and 2 cow days use/acre (17 ddu/ha, 84 edu/ha, and 5 cdu/ha). Most of the pellet groups were found along the first 200 feet of the baseline where the slope is not as steep.

The steep slope has obvious and unavoidable negative affects on soil stability. There is continuous soil loss from the loose, bare spots with deep-cut gullies nearby. Accumulation of sediment is apparent in the generally well-vegetated and effective terraces. Seeded grasses are restricted to the terraces, and the native grass, Salina wildrye, has only limited value in holding the soil on the steeper areas between terraces. The soil has a clay texture with a slightly alkaline pH (7.7). Soil depth varies from fairly deep to moderately shallow, but effective rooting depth averages more than 20 inches. Both phosphorus and potassium are limited at 3.9 and 35.2 ppm. Values less than 10 ppm for phosphorus and 70 ppm for potassium are known to inhibit normal plant growth and development.

The key species for wintering big game on this site are Utah serviceberry and true mountain mahogany. These two shrubs accounted for 72% of the shrub cover in 1994 and 75% in 1999. Due to the greatly increased sample size more serviceberry was encountered in 1994 and 1999 than in 1988. These plants average 4 to 5 feet in height, are moderately to heavily hedged, and in good vigor. Many plants have grown tall enough to be partly unavailable to browsing. The true mountain mahogany population appears stable and average 2-3 feet tall. The population is becoming increasingly mature. They show continued heavy use since 1988. Vigor is good however, with percent decadence very low. Other species include, mountain big sagebrush, stickyleaf low rabbitbrush, broom snakeweed, Woods rose, and snowberry.

The herbaceous understory is abundant along the first 200 feet of the baseline, but as the slope steepens further down the baseline, herbaceous plants become more rare and bare ground abundant. The dominant understory species is Salina wildrye which provided 97% of the grass cover and 88% of the total herbaceous cover in 1994. Currently (‘99) it accounts for 76% of the grass cover and 67% of the total herbaceous cover. This coarse, unpalatable bunchgrass did not appear to be utilized in 1994 or 1999. Forbs are uncommon and produce less than 2% total cover.

1994 TREND ASSESSMENT

Although litter cover has decreased by 60% (mostly because the baseline was lengthened), bare ground has remained similar to 1998 estimates. A majority of the vegetative cover is from browse with very little offered by forbs. Soil trend appears to be stable with little erosion apparent. Browse trend is stable. The large increase in the Utah serviceberry is due to increased sample size. True mountain mahogany has a stable population with good biotic potential although a slight increase in decadency. Herbaceous understory trend is down slightly. The dominant species, Salina wildrye, significantly decreased in its summed nested frequency. Summed nested frequency for grasses decreased while those of forbs increased slightly. All the forbs together make up only 4% of the total herbaceous cover.

TREND ASSESSMENT
soil - down slightly and in poor condition
browse - stable
herbaceous understory - stable, mostly Salina wildrye with very few forbs

1999 TEND ASSESSMENT

Trend for soil is slightly up, but still in poor condition with accelerated erosion occurring between contoured terraces. Percent bare ground has declined while litter cover has increased. In addition, sum of nested frequency for grasses and forbs has increased. Trend for the key browse species, serviceberry and true mountain mahogany, appear to be down slightly. Use is heavier, population densities have declined, and young recruitment is down on both species. Serviceberry is starting to grow tall enough to be partly unavailable to browsing. The proportion of plants displaying poor vigor has increased and percent decadence has gone up from 7% to 22%. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses has gone up slightly. However, sum of nested frequency for Salina wildrye, the dominant species, has remained similar to 1994. Forbs are still very limited, but sum of nested frequency has also increased slightly.

TREND ASSESSMENT
soil - slightly up, but still in poor condition
browse - down slightly
herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 21

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron cristatum	a-	a-	b23	-	-	9	-	2.04
G	Agropyron intermedium	a-	a3	b24	-	1	9	.38	.14
G	Agropyron spicatum	-	3	15	-	2	6	.01	1.24
G	Carex spp.	3	-	7	1	-	3	-	.06
G	Elymus salina	b244	a183	a176	89	62	60	13.91	10.89
G	Poa fendleriana	-	-	2	-	-	1	-	.03
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		247	189	247	90	65	88	14.30	14.42
Total for Grasses		247	189	247	90	65	88	14.30	14.42
F	Arenaria spp.	-	-	1	-	-	1	-	.00
F	Aster chilensis	a-	ab2	b16	-	1	5	.00	.45
F	Astragalus convallarius	-	3	-	-	1	-	.03	-
F	Astragalus megacarpus	-	2	3	-	2	2	.30	.04
F	Cymopterus spp.	a-	a-	b5	-	-	3	-	.01
F	Eriogonum umbellatum	-	1	4	-	1	2	.03	.01
F	Hedysarum boreale	-	-	-	-	-	-	-	.03
F	Helianthella uniflora	a-	b11	a-	-	5	-	.98	-

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Hymenoxys richardsonii	a-	a-	b4	-	-	3	-	.18
F	Lesquerella spp.	-	-	1	-	-	1	-	.03
F	Lomatium nuttallii	6	-	-	2	-	-	-	-
F	Machaeranthera grindelioides	-	-	2	-	-	2	.00	.06
F	Penstemon caespitosus	1	1	-	1	1	-	.00	-
F	Penstemon spp.	1	2	-	1	1	-	.03	-
F	Petradoria pumila	a-	a-	b13	-	-	7	-	.54
F	Phlox austromontana	2	5	5	1	2	4	.03	.21
F	Physaria chambersii	8	7	7	3	4	5	.04	.19
F	Schoencrambe linifolia	b7	a-	ab1	4	-	1	-	.00
F	Senecio multilobatus	-	-	4	-	-	1	-	.00
F	Unknown forb-perennial	2	-	3	1	-	1	-	.00
F	Zigadenus paniculatus	-	-	2	-	-	1	-	.00
Total for Annual Forbs		0	0	0	0	0	0	0	0
Total for Perennial Forbs		27	34	71	13	18	39	1.46	1.79
Total for Forbs		27	34	71	13	18	39	1.46	1.79

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 21

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	35	37	11.01	16.03
B	Artemisia frigida	0	0	-	-
B	Artemisia tridentata vaseyana	21	22	2.79	3.75
B	Cercocarpus montanus	45	36	7.94	7.24
B	Chrysothamnus viscidiflorus viscidiflorus	19	13	.54	.63
B	Eriogonum corymbosum	0	0	-	-
B	Gutierrezia sarothrae	4	10	.33	.09
B	Mahonia repens	0	2	-	.00
B	Pinus edulis	0	2	.15	-
B	Pinus flexilis	0	1	-	.63
B	Rosa woodsii	10	11	.52	.60
B	Sambucus cerulea	0	1	-	.74
B	Symphoricarpos oreophilus	27	32	2.96	1.05
B	Tetradymia canescens	0	3	-	.33
Total for Browse		161	170	26.26	31.12

CANOPY COVER --
Herd unit 16C, Study no: 21

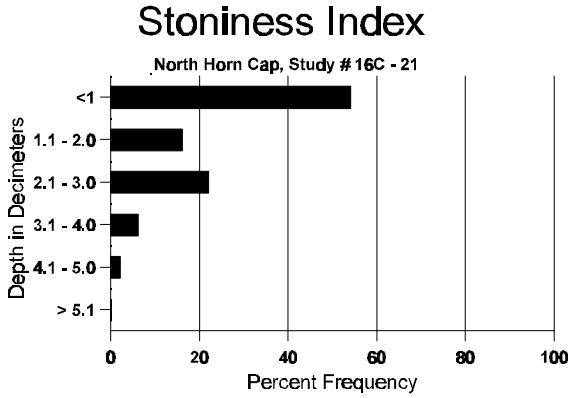
Species	Percent Cover '99
Amelanchier utahensis	11
Pinus flexilis	2

BASIC COVER --
Herd unit 16C, Study no: 21

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	249	264	6.50	37.77	43.00
Rock	252	212	12.75	14.61	14.06
Pavement	184	215	1.50	1.68	7.17
Litter	341	343	47.75	19.15	37.26
Cryptogams	3	-	0	.00	0
Bare Ground	330	291	31.50	31.32	25.20

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 21, Study Name: North Horn Cap

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
20.6	51.2 (17.6)	7.7	29.1	25.1	45.8	1.9	3.9	35.2	0.4



PELLET GROUP DATA --
Herd unit 16C, Study no: 21

Type	Quadrat Frequency ⁞94	⁞99	Pellet Transect Days Use/Acre (ha) ⁞99
Rabbit	16	30	n/a
Moose	5	-	0
Elk	12	11	34 (84)
Deer	3	7	7 (17)
Cattle	-	-	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 21

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	12	-	-	2	-	-	-	-	-	14	-	-	-	280			14
Y	88	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	24	7	1	6	-	-	-	-	-	38	-	-	-	760			38
	99	7	2	6	-	1	-	-	-	-	16	-	-	-	320			16
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	20	53	15	-	-	3	-	-	-	90	-	-	1	1820	47	43	91
	99	-	2	10	-	1	10	15	-	-	38	-	-	-	760	57	65	38
D	88	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	94	6	1	3	-	-	-	-	-	-	3	-	-	7	200			10
	99	-	1	5	-	-	6	3	-	-	7	-	-	8	300			15
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	50%	50%	00%	+98%
'94	44%	16%	06%	-50%
'99	10%	54%	12%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	66	Dec:	50%
'94	2780		7%
'99	1380		22%

Artemisia frigida																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	9	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	-
'94	0		-
'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	1	-	-	-	-	-	-	-	8	-	-	-	160			8
M	88	-	2	1	1	-	-	-	-	-	4	-	-	-	133	8	18	4
	94	24	13	1	-	-	-	-	-	-	38	-	-	-	760	20	26	38
	99	9	-	5	2	-	-	-	-	-	16	-	-	-	320	12	25	16
D	88	2	-	-	-	-	1	-	-	-	3	-	-	-	100			3
	94	6	-	-	2	-	-	-	-	-	2	-	-	6	160			8
	99	2	-	5	-	-	-	-	-	-	3	-	-	4	140			7
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	320			16
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	29%	29%	00%	+75%
'94	28%	02%	13%	-33%
'99	03%	32%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	233	Dec:		43%
'94	920			17%
'99	620			23%

Cercocarpus montanus																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	88	4	2	18	-	-	-	-	-	-	24	-	-	-	800			24
	94	26	-	-	-	-	-	-	-	-	26	-	-	-	520			26
	99	3	4	-	-	-	-	-	-	-	7	-	-	-	140			7
M	88	3	1	16	-	-	-	-	-	-	20	-	-	-	666	39	45	20
	94	14	25	14	-	-	2	-	-	-	55	-	-	-	1100	29	36	55
	99	-	2	27	-	-	7	2	-	-	32	6	-	-	760	33	38	38
D	88	-	1	1	-	-	-	-	-	-	2	-	-	-	66			2
	94	1	-	9	-	-	-	-	-	-	3	-	-	7	200			10
	99	-	-	-	-	-	2	1	-	-	2	1	-	-	60			3
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	09%	76%	00%	+16%
'94	27%	27%	08%	-47%
'99	13%	75%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1532	Dec:		4%
'94	1820			11%
'99	960			6%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1	8	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	88	2	-	1	-	-	-	-	-	-	3	-	-	-	100			3
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	10	1	-	-	-	-	-	-	-	11	-	-	-	366	7	9	11
	94	38	-	-	1	-	-	-	-	-	39	-	-	-	780	6	9	39
	99	17	-	-	1	-	-	-	-	-	18	-	-	-	380	10	11	19
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	320			16
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	07%	07%	00%	+43%
'94	00%	00%	00%	-44%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	466	Dec:	0%
	'94	820		0%
	'99	460		9%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum corymbosum																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	1	2	-	-	-	-	-	-	-	3	-	-	-	100	9	13	3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	88	-	2	10	-	-	-	-	-	-	12	-	-	-	400			12
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	25%	63%	00%
'94	00%	00%	00%
'99	00%	00%	00%

Total Plants/Acre (excluding Dead & Seedlings)			%Change
	'88	533	Dec: 75%
	'94	0	0%
	'99	0	0%

Gutierrezia sarothrae																		
Y	88	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	11	-	-	-	-	-	-	-	-	11	-	-	-	366	5	6	11
	94	28	-	-	-	-	-	-	-	-	28	-	-	-	560	7	9	28
	99	22	-	-	-	-	-	-	-	-	22	-	-	-	440	7	9	22

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+ 5%
'94	00%	00%	00%	-21%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
	'88	532	Dec: -
	'94	560	-
	'99	440	-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	4	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	220		-

Pinus edulis																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	40		-

Pinus flexilis																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	24	-	-	3	-	-	-	-	-	27	-	-	-	540			27
	99	70	-	-	-	-	-	-	-	-	70	-	-	-	1400			70
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	58	-	-	1	-	-	-	-	-	59	-	-	-	1180	9	8	59
	99	38	-	-	-	-	-	-	-	-	38	-	-	-	760	7	6	38

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+20%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	1720		-
	'99	2160		-

Sambucus cerulea																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	60	65	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

Symphoricarpos oreophilus																		
Y	88	3	2	-	1	-	-	4	-	-	10	-	-	-	333			10
	94	23	-	-	3	-	-	-	-	-	26	-	-	-	520			26
	99	10	-	-	1	-	-	-	-	-	11	-	-	-	220			11
M	88	-	3	-	-	-	-	1	-	-	4	-	-	-	133	12	10	4
	94	52	7	-	5	-	-	-	-	-	64	-	-	-	1280	14	22	64
	99	31	2	-	5	-	-	5	-	-	43	-	-	-	860	16	26	43
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	36%	00%	00%	+75%
'94	08%	00%	01%	-40%
'99	04%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	466	Dec:	0%
	'94	1860		3%
	'99	1120		4%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
Y	88	5	-	1	-	-	-	-	-	-	6	-	-	-	200			6
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	5	-	-	-	-	-	-	-	-	5	-	-	-	166	6	7	5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	9	0
	99	8	-	-	-	-	-	-	-	-	8	-	-	-	160	8	12	8
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	1	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	08%	00%
'94	00%	00%	00%
'99	00%	09%	09%

%Change			
Total Plants/Acre (excluding Dead & Seedlings)	'88	399	Dec: 8%
	'94	0	0%
	'99	220	9%

Trend Study 16C-22-99

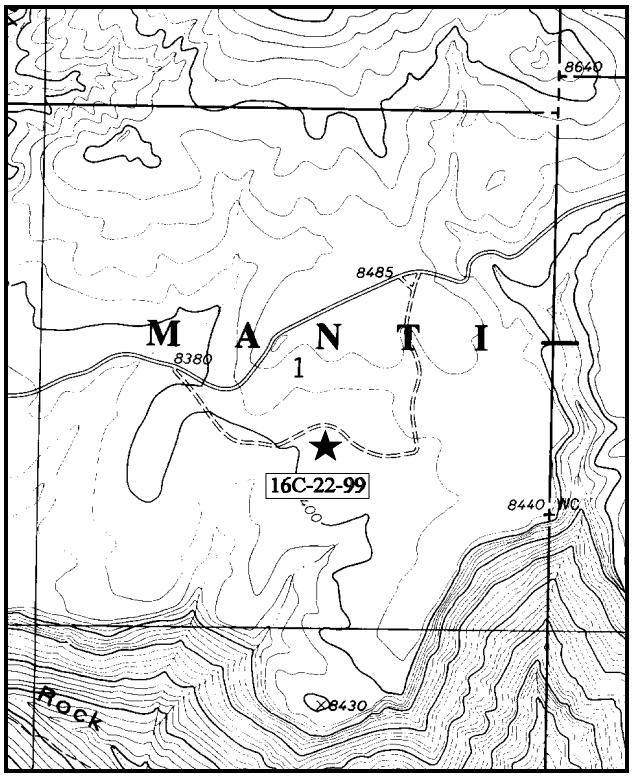
Study site name: North Horn-Rock Canyon . Range type Big Sagebrush-Grass .

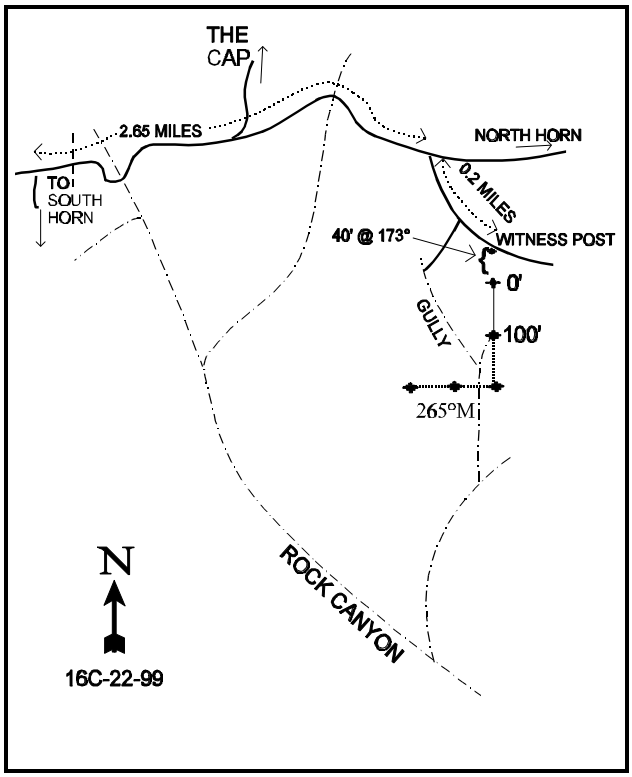
Compass bearing: frequency baseline 173°M-lines 1 & 2; 265°M-lines 3 & 4.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of the North Horn and South Horn roads, continue on the graded North Horn road. Go 0.8 miles and cross the upper end of Rock Canyon. Continue on main road 1.85 miles to a small fork. Bear right onto the dirt road (#130), and proceed 0.2 miles to a witness post on the right hand side of the road. The frequency baseline starts 40 feet south of the tall witness post. The 0-foot baseline stake is marked by a red browse tag #9008.





Map Name: The Cap , Diagrammatic Sketch

Township l9S , Range 6E , Section 1 UTM 4338259.909 N, 482827.112 E

DISCUSSION

Trend Study No. 16C-22 (31-20)

The North Horn-Rock Canyon study is located in a small basin at the head of Rock Canyon. The Rock Canyon drainage is a migration route from the high elevation range on North Horn and South Horn mountains down to pinyon-juniper and desert shrub winter range. The range type at the study site is sagebrush/grass, containing a mixture of mountain big sagebrush and black sagebrush with scattered mountain brush on the hillsides. Ponderosa pine, pinyon, and juniper trees are found in the drainages and along the canyon edge. The site has a southwest aspect on a slope that varies from 3-5% with an elevation of 8,400 feet. The small basin has never been terraced or seeded. The study site shows evidence of moderate use from both deer and elk. Cattle sign is relatively infrequent, possibly because grasses are more limited here than on surrounding terraced and seeded areas. Pellet group data from 1999 estimate 29 deer, 13 elk, and 15 cow days use/acre (72 ddu/ha, 32 edu/ha, and 37 cdu/ha). Most of the cattle pats were from the previous season but some were from earlier this summer.

Sandstone bedrock is exposed near the canyon edge. However, up the slope where sagebrush dominates, the soil appears to be relatively shallow. There are some more shallow spots of underlying bedrock favoring the more shallow rooted black sagebrush. Effective rooting depth is estimated at a little over 12 inches over the site. The sandy clay loam soil has a fairly high concentration of pavement and rock fragments in upper horizons and on the surface. Phosphorus is low at 5.5 ppm, where values less than 10 ppm are known to limit normal plant growth and development. Bare ground is fairly abundant in the shrub interspaces but there is little erosion occurring on the site.

A mixture of mountain big sagebrush and black sagebrush provides most of the forage on this site. Some individuals were difficult to identify and are most likely hybrids. Black sagebrush is more numerous and provided 50% of the shrub cover in 1994 and 44% in 1999. It numbered 11,266 mostly mature and decadent plants/acre in 1988. During the 1994 reading there were an estimated 5,160 plants/acre and in 1999, 5,580 plants/acre. The increased sample size was used in 1994 and 1999 are largely responsible for the change in density due to the lack of large numbers of dead plants. Black sagebrush has been lightly to moderately hedged and display good vigor. Most plants are mature with few young or seedlings sampled in 1994 or 1999. Percent decadence was moderately low at 24% in 1994 and 22% in 1999, but an increasing proportion of these decadent shrubs have been classified as dying, going from 18% to 28%.

Mountain big sagebrush provided 25% of the shrub cover in 1994 with a lower population density of 2,940 plants/acre. Density remained similar in 1999 with 2,520 plants/acre estimated. The majority of the population consist of mature and decadent plants with very few seedlings or young. Hedging has been light to moderate on most plants with some displaying heavy browsing. Vigor is normal on most plants, yet percent decadence is high and it has increased from 32% (1988) to 46% (1994), and 48% by 1999. Currently (‘99) 40% of the decadent shrubs appear to be dying. This is an increase from 29% in 1994.

The site supports two species of rabbitbrush, dwarf (*Chrysothamnus depressus*) and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus viscidiflorus*). All of the rabbitbrush was called dwarf rabbitbrush in 1988 and 1994, but most of the rabbitbrush is actually stickyleaf low rabbitbrush. Dwarf rabbitbrush currently (‘99) has a population density of 1,320 plants/acre. These shrubs are very low growing, averaging only 3 inches in height. Use was moderate to heavy and vigor good with percent decadence low. Stickyleaf low rabbitbrush is much more numerous at an estimated 7,700 plants/acre. These plants are mostly mature and unutilized. Other palatable browse species include Utah serviceberry and antelope bitterbrush. However, these species occur infrequently.

Grasses on average compose a majority of the herbaceous understory (90%). Western wheatgrass, muttongrass, and blue grama are the dominant grass species on this site. Bottlebrush squirreltail and needle-

and-thread grass were common in 1988 but have nearly disappeared from the site. Salina wildrye was picked up in the 1999 sample. A variety of low-growing forbs were sampled, but they do not provide much forage due to their low numbers.

1994 TREND ASSESSMENT

Bare ground has increased 14% with a decrease in litter and rock and pavement cover. Over half of the vegetative cover is from browse with the rest coming from grasses. Soil trend is slightly down. Key browse are mountain big sagebrush and black sagebrush. This appears to be a marginal site for mountain big sagebrush evidenced by mountain big sagebrush having nearly the same stature as black sagebrush. The mature mountain big sagebrush population declined by 41%, while the black sagebrush population declined by 54%. Most of these declines would be due to the much larger sample size utilized in 1994 which now gives much more accurate browse densities. Due to the dry conditions, very few seedling or young were encountered in 1994 for either species. Browse trend is slightly down. Summed nested frequency for grasses and forbs decreased since 1988 leading to a slightly down herbaceous trend.

TREND ASSESSMENT
soil - slightly down
browse - slightly down
herbaceous understory - slightly down especially for forbs

1999 TREND ASSESSMENT

Trend for soil appears to be stable. Percent cover of bare ground has declined with pavement cover increasing and litter cover declining slightly. Trend for browse is also stable for the time being. The black sagebrush population has increased slightly and percent decadence has declined from 24% to 22%. Reproduction is still poor however, with few seedlings and young plants encountered. Another negative aspect of the black sagebrush population is an increase in the proportion of decadent plants which appear to be dying (18% to 28%). There is currently not enough young plants to maintain the population. If recruitment does not improve in the future, the population will decline. Density of mountain big sagebrush declined slightly since 1994. Utilization is similar to 1994 levels, but the proportion of shrubs displaying poor vigor have increased. Percent decadence is high at 48%, a slight increase from 1994. In addition, the proportion of decadent plants classified as dying has increased from 29% to 40%. Recruitment for mountain big sagebrush is also inadequate to maintain the current population. Dwarf rabbitbrush is abundant and provides some additional forage. During the 1999 reading, most of what was called dwarf rabbitbrush (*Chrysothamnus depressus*) was actually stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus viscidiflorus*). The dwarf rabbitbrush displays moderate to heavy use while the stickyleaf low rabbitbrush is unutilized. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency of perennial grasses and forbs. Nested frequency of western wheatgrass declined significantly whereas frequency for mutton bluegrass increased significantly. Forbs are diverse but produce less than 2% cover.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 22

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron smithii	ab206	b217	a173	69	81	69	4.14	3.12
G	Bouteloua gracilis	66	93	90	28	38	36	1.56	2.65
G	Elymus salina	a-	a-	b74	-	-	30	-	1.41
G	Oryzopsis hymenoides	a-	b5	b5	-	3	3	.07	.16
G	Poa fendleriana	a89	ab109	b131	42	39	51	1.37	3.34
G	Poa secunda	-	4	3	-	2	1	.03	.00
G	Sitanion hystrix	b85	a3	a27	35	1	13	.00	.67
G	Stipa comata	b47	a1	a-	19	1	-	.00	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		493	432	503	193	165	203	7.19	11.38
Total for Grasses		493	432	503	193	165	203	7.19	11.38
F	Allium spp.	3	-	-	1	-	-	-	-
F	Androsace septentrionalis (a)	-	-	4	-	-	2	-	.03
F	Antennaria microphylla	-	1	-	-	1	-	.03	-
F	Arabis spp.	1	1	-	1	1	-	.00	-
F	Astragalus convallarius	-	2	-	-	1	-	.00	-
F	Astragalus spp.	-	3	2	-	1	1	.00	.03
F	Castilleja linariaefolia	b36	a4	a3	21	2	1	.03	.00
F	Chaenactis douglasii	b19	a-	b18	9	-	11	-	.16
F	Crepis acuminata	c22	a-	b6	13	-	5	-	.10
F	Cryptantha spp.	-	2	-	-	1	-	.00	-
F	Eriogonum alatum	-	-	1	-	-	1	-	.00
F	Erigeron eatonii	a7	ab24	b26	4	11	13	.13	.16
F	Erigeron pumilus	7	4	3	2	2	2	.01	.01
F	Eriogonum racemosum	14	13	23	6	8	13	.04	.29
F	Eriogonum umbellatum	-	-	2	-	-	1	-	.03
F	Haplopappus acaulis	a4	b12	a-	2	8	-	.18	-
F	Ipomopsis aggregata	a-	a-	b12	-	-	6	-	.03
F	Lupinus argenteus	a-	a-	b7	-	-	3	-	.06
F	Machaeranthera canescens	31	11	16	12	5	9	.02	.09
F	Penstemon spp.	-	1	-	-	1	-	.01	-
F	Pediocactus simpsonii	-	-	2	-	-	1	-	.03
F	Penstemon watsonii	2	7	6	1	4	4	.02	.05
F	Phlox austromontana	b18	a3	ab11	11	2	6	.01	.39
F	Senecio multilobatus	b29	a6	b49	15	3	24	.01	.24
F	Sphaeralcea coccinea	1	-	-	1	-	-	-	-
F	Trifolium spp.	-	-	1	-	-	1	-	.00
F	Unknown forb-perennial	1	-	2	1	-	1	-	.00

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
Total for Annual Forbs		0	0	4	0	0	2	0	0.03
Total for Perennial Forbs		195	94	190	100	51	103	0.52	1.72
Total for Forbs		195	94	194	100	51	105	0.52	1.75

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 22

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	0	2	-	.03
B	Artemisia nova	74	76	7.72	8.48
B	Artemisia tridentata vaseyana	71	58	3.87	4.39
B	Chrysothamnus depressus	85	41	3.50	.64
B	Chrysothamnus viscidiflorus viscidiflorus	0	81	-	5.10
B	Gutierrezia sarothrae	22	34	.16	.52
B	Pediocactus simpsonii	1	3	.03	-
B	Pinus edulis	0	2	-	-
B	Purshia tridentata	0	5	-	.30
B	Symphoricarpos oreophilus	0	1	-	-
Total for Browse		253	303	15.29	19.47

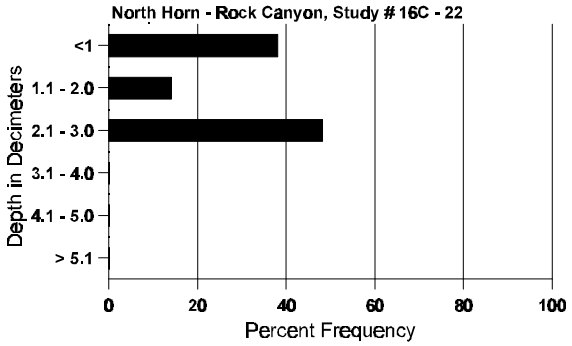
BASIC COVER --
Herd unit 16C, Study no: 22

Cover Type	Nested Frequency '94	'99	Average Cover % '88	'94	'99
Vegetation	304	308	6.25	23.82	32.56
Rock	258	99	.25	5.92	2.12
Pavement	250	297	12.25	2.67	11.30
Litter	378	339	45.00	20.31	16.80
Cryptogams	186	179	1.50	2.53	4.10
Bare Ground	373	348	34.75	40.54	35.50

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 22, Study Name: North Horn - Rock Canyon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.3	51.6 (13.5)	7.2	60.4	17.8	21.8	1.7	5.5	73.6	0.6

Stoniness Index



PELLET GROUP DATA --
Herd unit 16C, Study no: 22

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	28	18	n/a
Elk	23	12	13 (32)
Deer	16	12	29 (72)
Cattle	-	3	15 (37)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 22

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
Y	88	2	1	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	3	2	-	-	-	-	-	-	5	-	-	-	333	19	12	5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	14	0
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20	24	40	1
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	50%	25%	00%
'94	00%	00%	00%
'99	00%	100%	50%

Total Plants/Acre (excluding Dead & Seedlings)	%Change		
'88	533	Dec:	0%
'94	0		0%
'99	40		50%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	88	6	-	-	-	-	-	-	-	-	5	-	1	-	400			6
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	13	1	-	-	-	-	-	-	-	14	-	-	-	933			14
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	5	1	-	-	-	-	-	-	-	6	-	-	-	120			6
M	88	85	7	1	-	-	-	-	-	-	90	-	3	-	6200	7	11	93
	94	167	28	2	-	-	-	-	-	-	195	2	-	-	3940	9	19	197
	99	126	62	25	-	-	-	-	-	-	213	-	-	-	4260	7	17	213
D	88	60	2	-	-	-	-	-	-	-	43	1	15	3	4133			62
	94	43	14	4	-	-	-	-	-	-	50	-	-	11	1220			61
	99	44	8	7	1	-	-	-	-	-	43	-	-	17	1200			60
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	06%	.59%	12%	-54%
'94	16%	02%	04%	+ 8%
'99	25%	11%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	11266	Dec:	37%
	'94	5160		24%
	'99	5580		22%

Artemisia tridentata vaseyana																		
S	88	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	13	-	-	-	-	-	-	-	-	13	-	-	-	866			13
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	4	-	1	-	-	-	-	-	-	5	-	-	-	100			5
M	88	21	12	6	-	-	-	-	-	-	38	-	1	-	2600	10	15	39
	94	60	17	-	-	-	-	-	-	-	76	-	-	1	1540	9	20	77
	99	24	22	15	-	-	-	-	-	-	61	-	-	-	1220	11	24	61
D	88	18	4	3	-	-	-	-	-	-	20	-	4	1	1666			25
	94	37	28	3	-	-	-	-	-	-	48	-	-	20	1360			68
	99	22	22	11	5	-	-	-	-	-	36	-	-	24	1200			60
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	240			12

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	21%	12%	08%	-43%
'94	31%	02%	14%	-14%
'99	35%	21%	19%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	5132	Dec:	32%
	'94	2940		46%
	'99	2520		48%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
S	88	6	-	-	-	-	-	3	-	-	9	-	-	-	600			9
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	12	1	-	-	-	-	-	-	-	13	-	-	-	866			13
	94	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
	99	-	4	-	-	-	-	-	-	-	4	-	-	-	80			4
M	88	55	16	2	-	-	-	-	-	-	72	-	1	-	4866	3	6	73
	94	277	40	12	1	-	-	-	-	-	330	-	-	-	6600	3	8	330
	99	22	14	19	-	2	1	-	-	-	58	-	-	-	1160	3	7	58
D	88	7	-	1	1	-	-	-	-	-	6	-	3	-	600			9
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	2	-	2	-	-	-	-	3	-	-	1	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	18%	03%	04%	+ 8%
'94	12%	03%	00%	-81%
'99	33%	33%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	6332	Dec:		9%
'94	6900			0%
'99	1320			6%

Chrysothamnus viscidiflorus viscidiflorus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	341	-	-	-	-	-	-	-	-	341	-	-	-	6820	5	11	341
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	24	-	-	-	-	-	-	-	-	24	-	-	-	480			24

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	0%
'94	0		0%
'99	7700		6%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266	6	7	4
	94	43	-	-	-	-	-	-	-	-	43	-	-	-	860	4	23	43
	99	98	-	-	-	-	-	-	-	-	98	-	-	-	1960	6	8	98
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+58%
'94	00%	00%	00%	+52%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	399	Dec:	-
	'94	960		-
	'99	2020		-

Pediocactus simpsonii																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	2	2	1
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	3	4	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+75%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	80		-

Pinus edulis																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	53	0
	99	-	2	8	-	-	-	-	-	-	10	-	-	-	200	10	52	10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	20%	80%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	200			-

Symphoricarpos oreophilus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	20			-

Trend Study 16C-23-99

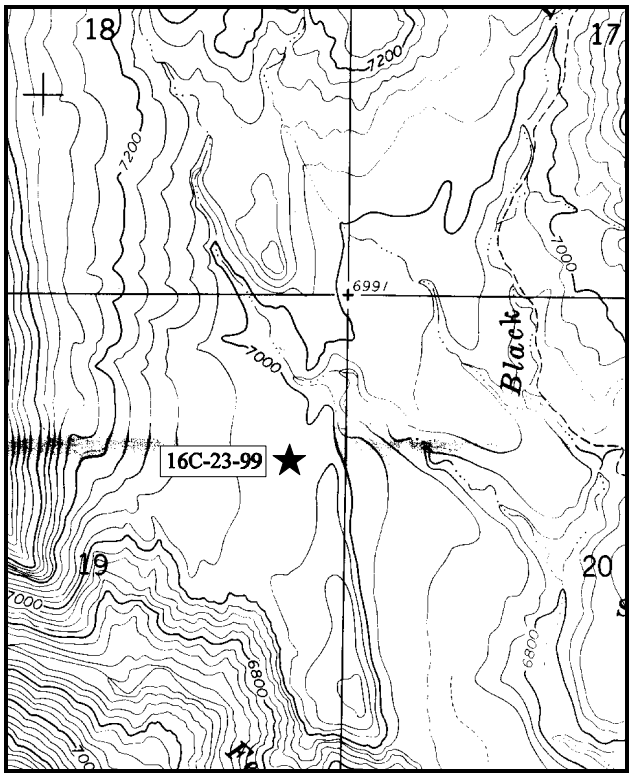
Study site name: Black Dragon . Range type: Big Sagebrush - Grass .

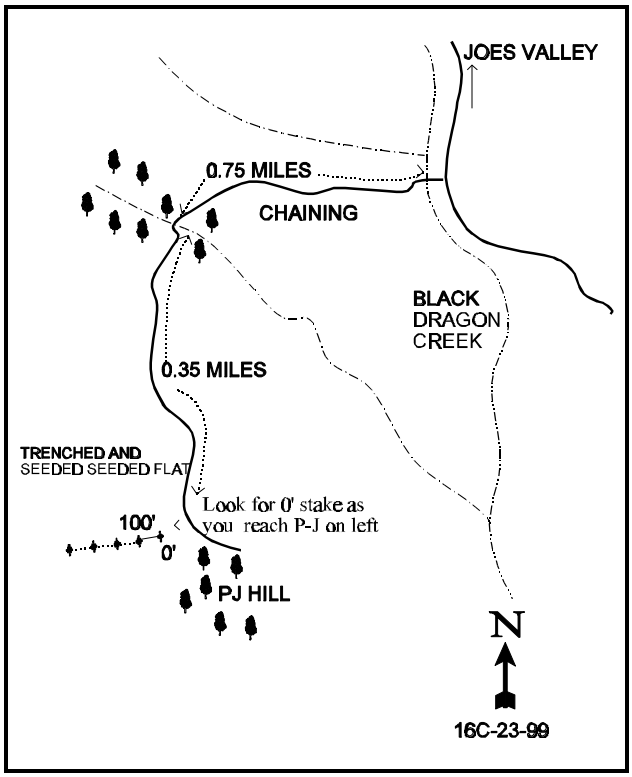
Compass bearing: frequency baseline 239°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction near the fence at the top of North Dragon Creek above Joes Valley, take the middle road (F.S. #170). Go down the Black Dragon trail 0.5 miles to a gate. Continue driving down the canyon 2.75 miles to a fork. Bear right across the creek. Proceed 0.75 miles through a chaining and down into a dry creek bottom. Cross and continue across a seeded sage flat for 0.35 miles to where the road turns to the left towards a P-J hill. There is a green fencepost on the right side of the road as a witness post. From the post, the 0-foot baseline stake is 117 feet bearing 221°, and is marked by tag #484.





Map Name: Ferron Canyon , Diagrammatic Sketch

Township l9S , Range 6E , Section 19 UTM 4333918.550 N, 475542.986 E

DISCUSSION

Trend Study No. 16C-23 (31-21)

The Black Dragon study site is located between Joe's Valley and Ferron Canyon. The Black Dragon area is important winter range for deer and increasingly important for elk. The pinyon-juniper type in the valley was chained and seeded. There are naturally open sagebrush flats, one of which was sampled by this trend study. The area was contour-trenched and seeded in 1965. It is now occupied by sagebrush and seeded grasses. The study site has an elevation of 7,000 feet. Drainage is generally south down Black Dragon Creek into Ferron Creek. On the study site, drainage is to the north and the aspect is more to the northeast. Like the two preceding studies, it is part of the Horn Mountain Allotment. Since it is a small unit, it is grazed by only a portion of the livestock in early spring. Use by cattle at the site is minimal due to lack of water in the area. Deer and elk appear to use the area moderately. Pellet group data from 1999 estimate 40 deer, 53 elk and 10 cow days use/acre (99 ddu/ha, 13 edu/ha, 25 cdu/ha). All of the cattle pats were from last season. Most of the elk and deer pellet groups were from winter, although a few of the elk pellet groups were from this spring (‘99).

The soil appears to a moderate depth but strongly compacted, with a hardpan about 10-12 inches below the surface. The hard pan appears to be a calcium carbonate layer of cemented gravel. The soil is a fine-textured sandy clay loam with small gravel on the surface and within the profile. Parent material is a combination of limestone, sandstone, and quartz. The amount of phosphorus is marginal at 6.9 ppm and potassium is low at 60.8 ppm. Values less than 10 ppm for phosphorus and 70 ppm for potassium can limit normal plant growth and development. At intervals of 30 to 40 feet, there are contour-furrows which have effectively eliminated most problems from erosion. There is some bare soil exposed, especially on the top edges of the furrows, but generally there is adequate ground and vegetative cover. Between the evenly distributed shrubs and bunch grasses there are large patches of bare soil with a diffused covering of rocks and pavement. There is some localized erosion occurring, yet it is not serious due to the contour-furrows treatment.

A small statured mountain big sagebrush is the key browse species. It provided 40% of the browse cover in 1994 and 43% in 1999. Density was extremely high in 1988 with an estimated 49,799 plants/acre. However, 90% of these were very young plants. In 1994 there were 9,040 plants/acre estimated and in 1999, 10,180. Young plants accounted for 28% of the population in 1994, increasing to 54% by 1999. Utilization of the sagebrush has become increasingly heavy with 74% of the sagebrush sampled displaying heavy use in 1999. Nevertheless, vigor is good and percent decadence is low at only 15% in 1999.

Another palatable browse species on the site consists of low growing winterfat. It currently (‘99) shows moderate to heavy use and due to its small size, probably has been heavily utilized for many years. The population is almost entirely mature with a few young. Rabbitbrush is the most abundant shrub on the site with an estimated density of 18,780 plants/acre in 1994 and 19,680 in 1999. This population has shifted from mostly young plants in 1988 to mostly mature plants by 1994 and 1999 (88% and 93% respectively). These small shrubs average only 6 inches in height but provide 56% of the browse cover.

Herbaceous plants are moderately abundant. Crested wheatgrass provides most of the grass cover. It is especially dense within the contour furrows. Native needle-and-thread, bluebunch wheatgrass, bottlebrush squirreltail, and Indian ricegrass are also fairly numerous. Forbs are rare, producing less than 1% total cover and producing little useful forage. The most common species include prickly phlox and scarlet globemallow.

1994 TREND ASSESSMENT

Percent bare ground has decreased, although due to drought litter has decreased as well. Most of the ground cover is provided by grasses and browse. Soil trend is stable at this time. Mountain big sagebrush shows an expanding population with 28% of the population consisting of young plants. Most of the sagebrush is lightly

to moderately hedged. Percent decadency is low at 16%. Rabbitbrush also shows an expanding population with many of the young sampled in 1988 surviving to maturity by 1994. Browse trend is stable, although it could be considered slightly up if not for the abundance of the less desirable low rabbitbrush. Trend for herbaceous understory is slightly down with a decrease in sum of nested frequency for grasses and forbs combined. Sum of nested frequency of grasses has actually gone up slightly, with summed frequency of forbs dropping dramatically.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - slightly down especially for forbs

1999 TREND ASSESSMENT

Trend for soil is stable with similar "relative percent" cover estimates for bare ground and litter. There is some localized erosion occurring between the contour furrows, but the treatment keeps erosion to a minimum. Trend for browse is also stable. Density of mountain big sagebrush has increased slightly and the proportion of young plants has increased. Percent decadence has remained stable although utilization is currently very heavy with 74% of the sagebrush sampled displaying heavy use. The population of the less desirable stickyleaf low rabbitbrush has increased slightly. It currently provides 56% of the shrub cover. The population is mostly mature (93%). Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has declined slightly, while nested frequency of the dominant crested wheatgrass has increased slightly. Both Indian ricegrass and needle-and-thread declined significantly in nested frequency. Forbs are rare and unimportant on this site. Nested frequency and cover for forbs has remained similar to 1994 levels.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 23

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	⁄94	⁄99
G	Agropyron cristatum	256	234	245	90	76	86	7.96	6.82
G	Agropyron intermedium	$_{b}$63	$_{a}$4	$_{a}$8	24	2	5	.03	.07
G	Agropyron spicatum	6	6	16	3	3	7	.16	.45
G	Bouteloua gracilis	$_{a}$-	$_{b}$31	$_{b}$27	-	10	10	.90	.93
G	Oryzopsis hymenoides	$_{b}$51	$_{c}$77	$_{a}$20	23	34	8	1.24	.33
G	Sitanion hystrix	$_{a}$17	$_{a}$29	$_{b}$49	10	11	22	.30	.55
G	Sporobolus cryptandrus	-	1	4	-	1	2	.03	.01
G	Stipa comata	$_{ab}$50	$_{b}$78	$_{a}$48	24	30	20	2.33	.71
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		443	460	417	174	167	160	12.97	9.90
Total for Grasses		443	460	417	174	167	160	12.97	9.90

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Astragalus calycosus	$_{b}$19	$_{a}$2	$_{ab}$7	10	2	6	.01	.03
F	Calochortus nuttallii	3	-	1	2	-	1	-	.00
F	Chenopodium spp. (a)	-	$_{b}$6	$_{a}$-	-	3	-	.01	-
F	Erigeron pumilus	$_{b}$21	$_{a}$-	$_{b}$8	9	-	4	-	.07
F	Machaeranthera canescens	$_{b}$37	$_{a}$4	$_{a}$3	23	2	2	.01	.06
F	Microsteris gracilis (a)	-	-	3	-	-	1	-	.00
F	Phlox longifolia	$_{c}$164	$_{b}$50	$_{a}$17	64	25	8	.15	.06
F	Senecio multilobatus	1	-	-	1	-	-	-	-
F	Sphaeralcea coccinea	66	44	45	30	26	21	.24	.22
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total for Annual Forbs		0	6	3	0	3	1	0.01	0.00
Total for Perennial Forbs		312	100	81	140	55	42	0.41	0.45
Total for Forbs		312	106	84	140	58	43	0.42	0.46

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 23

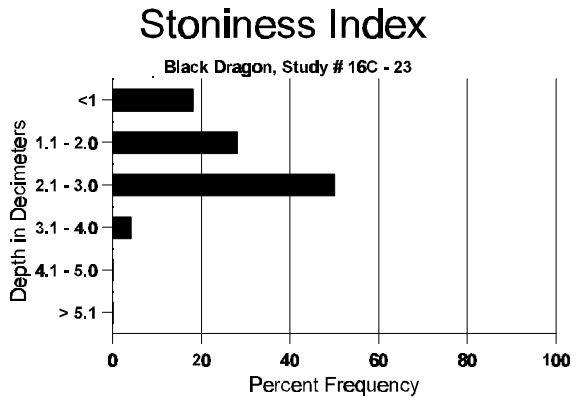
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Artemisia nova	0	0	-	-
B	Artemisia tridentata vaseyana	95	96	5.84	7.78
B	Ceratoides lanata	17	16	.09	.12
B	Chrysothamnus viscidiflorus viscidiflorus	95	92	7.64	10.25
B	Opuntia spp.	7	13	.04	.01
Total for Browse		214	217	13.62	18.17

BASIC COVER --
Herd unit 16C, Study no: 23

Cover Type	Nested Frequency '94	'99	Average Cover % '88	'94	'99
Vegetation	341	324	6.75	24.96	27.18
Rock	318	65	.75	4.69	.76
Pavement	185	275	10.00	.74	7.55
Litter	381	336	37.25	19.30	17.26
Cryptogams	28	23	1.00	.08	.11
Bare Ground	369	345	44.25	37.02	40.47

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 23, Study Name: Black Dragon

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.4	65.6 (13.0)	7.1	57.4	16.7	25.8	1.7	6.9	60.8	0.7



PELLET GROUP DATA --
Herd unit 16C, Study no: 23

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	36	14	n/a
Elk	29	44	53 (131)
Deer	38	22	40 (99)
Cattle	4	2	10 (25)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 23

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
Y	88	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133	6	15	2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	33%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	199	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	62	2	-	1	-	-	-	-	-	65	-	-	-	4333			65
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	8	4	-	-	-	-	-	-	16	-	-	-	320			16
Y	88	656	5	8	-	-	-	-	-	-	667	-	2	-	44600			669
	94	124	3	-	-	-	-	-	-	-	127	-	-	-	2540			127
	99	41	47	172	-	-	13	-	-	-	273	-	-	-	5460			273
M	88	7	8	19	-	-	-	-	-	-	34	-	-	-	2266	8	12	34
	94	186	63	3	-	-	-	-	-	-	252	-	-	-	5040	9	18	252
	99	-	23	112	-	5	18	-	-	-	156	-	2	-	3160	11	22	158
D	88	16	12	16	-	-	-	-	-	-	37	-	2	5	2933			44
	94	52	19	-	2	-	-	-	-	-	41	-	-	32	1460			73
	99	-	9	57	-	7	5	-	-	-	58	-	3	17	1560			78
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	320			16
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	640			32

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	03%	06%	01%	-82%
'94	19%	.66%	07%	+11%
'99	18%	74%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	49799	Dec:	6%
	'94	9040		16%
	'99	10180		15%

Ceratoides lanata																		
Y	88	-	2	1	-	-	-	-	-	-	3	-	-	-	200			3
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	6	12	1	-	-	-	-	-	19	-	-	-	1266	4	3	19
	94	19	5	-	-	-	-	-	-	-	24	-	-	-	480	3	4	24
	99	3	20	2	-	3	2	-	-	-	29	1	-	-	600	7	7	30

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	36%	59%	00%	-65%
'94	19%	00%	00%	+16%
'99	74%	13%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1466	Dec:	-
	'94	520		-
	'99	620		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
S	88	29	-	-	-	-	-	-	-	-	29	-	-	-	1933			29
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	88	174	2	-	-	-	-	-	-	-	176	-	-	-	11733			176
	94	112	-	-	-	-	-	-	-	-	112	-	-	-	2240			112
	99	53	9	2	-	-	-	-	-	-	64	-	-	-	1280			64
M	88	32	1	-	-	-	-	-	-	-	33	-	-	-	2200	5	8	33
	94	825	-	-	-	-	-	-	-	-	825	-	-	-	16500	4	9	825
	99	857	60	-	3	-	-	-	-	-	920	-	-	-	18400	6	12	920
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	01%	00%	00%	+26%
'94	00%	00%	00%	+ 5%
'99	07%	.20%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	13933	Dec:	0%
	'94	18780		0%
	'99	19680		0%

Opuntia spp.																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	6	-	-	-	-	-	-	-	-	3	-	3	-	400	3	7	6
	94	7	-	-	-	-	-	-	-	-	7	-	-	-	140	3	6	7
	99	12	-	-	-	-	-	-	-	-	12	-	-	-	240	3	14	12
D	88	1	-	-	-	-	-	-	-	-	-	-	-	1	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	27%	-86%
'94	00%	00%	00%	+53%
'99	00%	00%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	999	Dec:	7%
	'94	140		0%
	'99	300		7%

Trend Study 16C-24-99

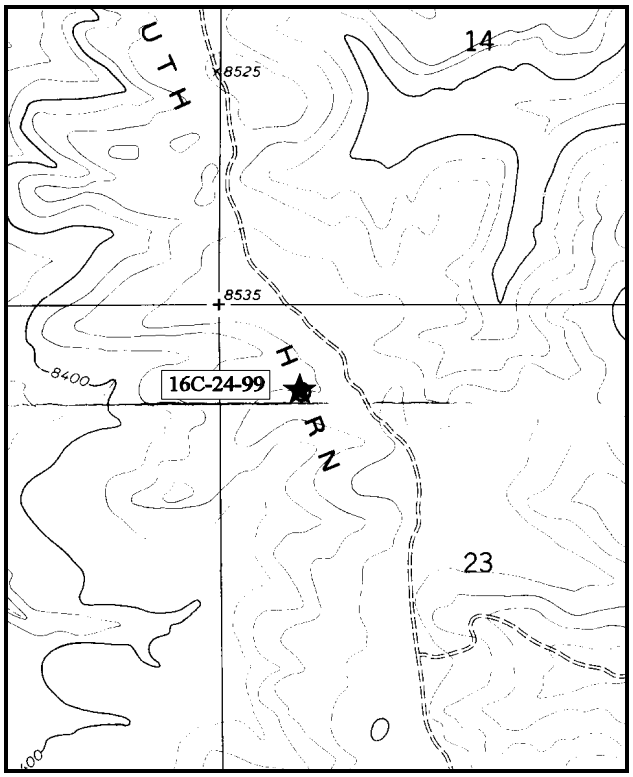
Study site name: South Horn Exclosure . Range type: Mixed Mountain Brush .

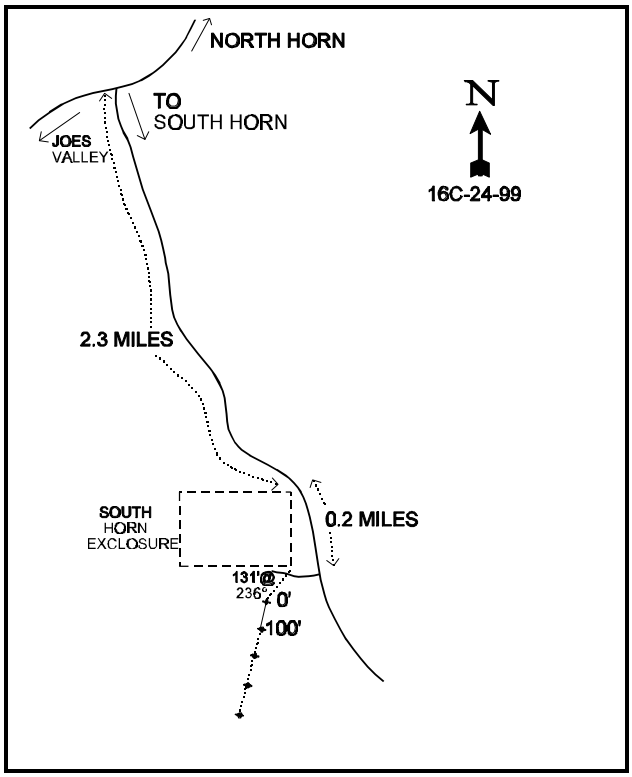
Compass bearing: frequency baseline 206°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of the North Horn and South Horn roads, turn right (south) onto the South Horn roadv(#21). Proceed 2.3 miles to the NE corner of an exclosure. Continue 0.2 miles past the exclosure to a faint road. Turn right onto this faint road and go 0.15 miles to the SE corner of the exclosure. The 0-foot baseline stake is approximately 130 feet southwest (236°) of the SE corner.





Map Name: The Cap

Diagrammatic Sketch

Township 19S , Range 6E , Section 23

UTM 4334202.893 N, 480762.528 E

DISCUSSION

Trend Study No. 16C-24 (31-22)

The South Horn Exclosure study samples a mixed mountain brush community dominated by true mountain mahogany and scattered, very old pinyon pine. The study is located on the south side of the South Horn Mountain Exclosure. It has a gradual 5% slope and a northwest aspect with an elevation of 8,500 feet. The site is representative of north slopes in the area which support a higher density of true mountain mahogany. The area is primarily used by elk in the winter, although sign of mule deer is also frequent. Rabbit sign is abundant. Grazed in the summer by cattle on the Horn Mountain allotment, this particular area receives less cattle use than the seeded sagebrush flats. Pellet group data from 1999 estimate 32 deer, 33 elk and only 3 cow days use/acre (79 ddu/ha, 82 edu/ha, and 7 cdu/ha). All cow pats were from last season. All of the deer and elk pellet groups appeared to be from the last winter.

Soil on the site is relatively shallow (effective rooting depth of just over 9 inches) and very rocky throughout the profile. The upper 6 inches is a visibly darker soil, beyond this, it is a light colored fine sand. Overall soil texture is a sandy loam with a neutral pH (6.8). Phosphorus and potassium are limited at just 4.2 ppm and 32 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium can limit normal plant growth and development. The majority of the soil surface is protected by vegetation and associated litter. The bare shrub interspaces do experience some soil loss and runoff, but the problem is not widespread or severe.

The site supports a variety of browse species. The key species include true mountain mahogany, serviceberry, and mountain big sagebrush. Mountain mahogany is represented by a small population of mostly mature plants which average a little over four feet in height, making some plants partly unavailable. They numbered an estimated 1,800 plants/acre in 1988 and only 200 plants/acre by 1994. The change in density is a reflection of the larger sample taken in 1994, which gives a more representative sample of aggregated shrub with discontinuous distributions. Density increased slightly to 320 plants/acre by 1999. The true mountain mahogany are vigorous, in good vigor, and display moderate to heavy hedging.

Mountain big sagebrush is the most common shrub on the site and some of the more open areas are completely dominated by it. It provided 36% of the shrub cover in 1994 and 47% in 1999. The sagebrush population currently (‘99) numbers 2,540 plants/acre with good vigor and light to moderate hedging. Snowberry and Utah serviceberry are present at low densities. Mature serviceberry are very large averaging nearly seven feet in heigh making many plants partly unavailable. There are also some large treelike curlleaf mountain mahogany. Both serviceberry and curlleaf mountain mahogany display moderate to heavy use on forage that is available. Large and very old pinyon and juniper trees are scattered throughout the site. Point quarter data from 1999 estimate 30 pinyon and 13 Rocky mountain juniper trees/acre. Average diameter of pinyon is estimated at 15 inches while juniper averages over 20 inches. Overhead canopy cover is variable, but averages 15% for pinyon and 3% for juniper.

The herbaceous understory is diverse but not very abundant. Eleven species of grasses encountered in 1999 produced only 5% cover and 21 species of forbs provided only an additional 3% cover. The most abundant grasses include, Salina wildrye, Indian ricegrass, mutton bluegrass, and Carex. Common forbs include, rockcress, bastard toadflax, and Eaton fleabane.

1994 TREND ASSESSMENT

Litter cover has decreased but is still extensive at 61%. Bare ground increased slightly with browse offering most of the vegetative cover. Soil trend is still considered stable. Mountain big sagebrush has a stable mature population, however 38% of the population is decadent and recruitment is down. Therefore, trend for browse is slightly down. Grasses and forbs have significantly decreased in nested frequency values indicating a slightly downward herbaceous understory trend.

TREND ASSESSMENT
soil - stable
browse - slightly down
herbaceous understory - slightly down

1999 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare ground from 23% to 17% and a slight increase in litter. Vegetation cover has gone up, but most of the improvement comes from shrubs and trees, which increased in cover from 14% in 1994 to 24% in 1999. Herbaceous plants, which are more effective at holding soil in place, increased in cover from 6% to 9%. Localized erosion is occurring, although it is not a problem. Trend for browse is up slightly. Density of mountain big sagebrush has increased, recruitment is improved, and percent decadence has declined from 38% to 6%. True mountain mahogany is more heavily hedged but density has increased slightly, vigor is normal, and reproduction has improved. Serviceberry has also increased in density. Most of the plants are very large however and partially unavailable to browsing. Available portions of these shrubs display moderate to heavy use. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has remained similar to 1994 estimates, although nested frequency of perennial forbs increased slightly. Composition is diverse and very similar to 1994 with herbaceous plants only producing about 9% cover.

TREND ASSESSMENT
soil - up slightly
browse - up slightly
herbaceous understory - stable

1999 exclosure observations:
The nearby exclosure has more of a western aspect than the trend study site. The total exclosure contains a lot of curlleaf mountain mahogany which are about 4 to 6 foot in height. They do not appear to be producing seed and they contain many yellow leaves. There are a few decadent tree-like curlleaf. Visually, there appears to be little difference between outside and inside of the total exclosure with regard to sagebrush and grass cover and health. The livestock exclosure also appears to have similar health and vigor for sagebrush compared to outside. Grass composition and abundance also look similar. There are no curlleaf mountain mahogany in the livestock exclosure. A few large highlined serviceberry plants occur in the livestock exclosure.

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 24

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron intermedium	$_{b}$144	$_{a}$7	3	55	3	1	.01	.00
G	Agropyron trachycaulum	$_{a}$-	$_{a}$2	$_{b}$84	-	1	31	.03	.50
G	Carex spp.	$_{b}$46	$_{a}$14	$_{ab}$23	20	8	12	.11	.82
G	Elymus salina	$_{a}$-	$_{c}$70	$_{b}$43	-	30	19	.71	1.59
G	Festuca ovina	$_{a}$-	$_{b}$33	$_{a}$3	-	14	2	.36	.03
G	Koeleria cristata	$_{a}$-	$_{c}$37	$_{b}$6	-	13	3	.33	.06
G	Oryzopsis hymenoides	$_{a}$-	$_{b}$17	$_{b}$21	-	8	11	.57	.79
G	Poa fendleriana	$_{a}$-	$_{b}$38	$_{c}$58	-	16	25	.29	.81
G	Poa secunda	$_{b}$60	$_{a}$30	$_{a}$13	31	12	5	.52	.22
G	Sitanion hystrix	$_{a}$-	$_{b}$6	$_{a}$-	-	3	-	.01	-
G	Stipa comata	$_{b}$56	$_{a}$26	$_{a}$5	23	12	3	.50	.04
G	Stipa lettermani	$_{b}$11	$_{a}$-	$_{b}$9	6	-	5	-	.12
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		317	280	268	135	120	117	3.48	5.02
Total for Grasses		317	280	268	135	120	117	3.48	5.02
F	Androsace septentrionalis (a)	-	$_{a}$-	$_{b}$49	-	-	22	-	.18
F	Arabis spp.	61	64	57	27	28	21	.29	.35
F	Chenopodium album (a)	-	5	-	-	2	-	.01	-
F	Comandra pallida	$_{b}$29	$_{ab}$24	$_{a}$20	13	8	8	.52	.60
F	Collinsia parviflora (a)	-	15	10	-	6	4	.05	.02
F	Crepis acuminata	$_{b}$57	$_{a}$6	$_{a}$16	27	3	7	.04	.10
F	Cryptantha spp.	$_{b}$38	$_{a}$11	$_{a}$16	20	8	6	.16	.27
F	Delphinium nuttallianum	$_{b}$13	$_{a}$-	$_{a}$-	7	-	-	-	-
F	Eriogonum alatum	23	20	15	14	9	8	.34	.31
F	Eriogonum cernuum (a)	-	5	2	-	2	1	.01	.03
F	Erigeron eatonii	$_{b}$75	$_{a}$48	$_{a}$42	35	20	18	.37	.24
F	Erigeron spp.	-	5	-	-	2	-	.01	-
F	Eriogonum umbellatum	$_{b}$13	$_{a}$1	$_{a}$1	6	1	1	.00	.03
F	Gayophytum ramosissimum (a)	-	$_{b}$9	$_{a}$-	-	3	-	.06	-
F	Heterotheca villosa	$_{a}$-	$_{a}$-	$_{b}$5	-	-	3	-	.21
F	Lappula occidentalis (a)	-	-	5	-	-	2	-	.01
F	Lupinus spp.	4	-	-	2	-	-	-	-
F	Machaeranthera canescens	$_{b}$18	$_{a}$2	$_{a}$-	8	2	-	.03	.03
F	Penstemon humilis	$_{b}$25	$_{a}$2	$_{a}$5	12	2	2	.01	.03
F	Penstemon spp.	-	-	5	-	-	2	-	.12
F	Phlox austromontana	$_{b}$49	$_{a}$9	$_{a}$4	24	5	2	.21	.03
F	Phlox spp.	-	-	7	-	-	2	-	.18
F	Polygonum douglasii (a)	$_{a}$-	$_{c}$85	$_{b}$21	-	29	9	.14	.04

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Potentilla spp.	-	3	-	-	1	-	.00	-
F	Schoencrambe linifolia	$_{a}$-	$_{b}$13	$_{c}$46	-	5	20	.05	.40
F	Senecio multilobatus	$_{b}$24	$_{a}$4	$_{b}$31	12	2	14	.01	.19
F	Sphaeralcea coccinea	$_{a}$-	$_{ab}$4	$_{b}$9	-	1	4	.00	.02
F	Townsendia spp.	$_{b}$24	$_{a}$2	$_{a}$-	9	1	-	.03	-
Total for Annual Forbs		0	119	87	0	42	38	0.28	0.29
Total for Perennial Forbs		453	218	279	216	98	118	2.11	3.14
Total for Forbs		453	337	366	216	140	156	2.40	3.43

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 24

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	2	6	2.32	1.83
B	Artemisia tridentata vaseyana	54	59	5.16	11.05
B	Cercocarpus ledifolius	3	4	-	.48
B	Cercocarpus montanus	10	15	4.22	4.55
B	Chrysothamnus viscidiflorus	18	16	.28	.24
B	Gutierrezia sarothrae	7	5	.04	.21
B	Juniperus osteosperma	-	-	.15	-
B	Leptodactylon pungens	11	11	.10	.54
B	Mahonia repens	0	0	-	-
B	Opuntia spp.	7	12	.07	.29
B	Pinus edulis	0	1	1.46	2.76
B	Purshia tridentata	2	2	-	-
B	Sambucus racemosa	0	0	-	-
B	Sclerocactus whipplei	0	0	-	-
B	Symphoricarpos oreophilus	13	16	.58	1.76
B	Tetradymia canescens	1	0	-	-
Total for Browse		128	147	14.41	23.74

CANOPY COVER --
Herd unit 16C, Study no: 24

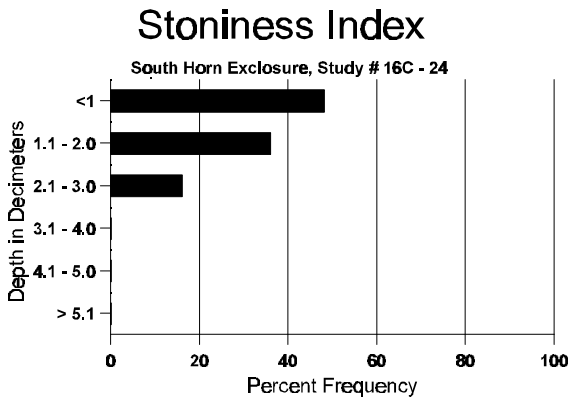
Species	Percent Cover '99
Amelanchier utahensis	2
Cercocarpus ledifolius	2
Cercocarpus montanus	2
Juniperus scopulorum	3
Pinus edulis	15

BASIC COVER --
Herd unit 16C, Study no: 24

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	269	289	2.50	20.51	31.71
Rock	58	32	.75	.44	.89
Pavement	34	63	.75	.05	.66
Litter	392	377	75.00	61.38	62.79
Cryptogams	37	60	1.00	.54	.46
Bare Ground	215	181	20.00	22.79	17.32

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 24, Study Name: South Horn Exclosure

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.3	55.2 (9.7)	6.8	76.7	11.4	11.8	0.8	4.2	32.0	0.5



PELLET GROUP DATA --
Herd unit 16C, Study no: 24

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	52	55	n/a
Elk	30	13	33 (82)
Deer	23	26	32 (79)
Cattle	1	-	3 (7)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 24

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	88	-	-	-	-	-	-	3	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	24	-	-	-	-	-	-	-	-	24	-	-	-	480			24
Y	88	1	-	-	1	-	-	1	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	2	-	-	-	-	-	-	-	2	-	-	-	133	42	31	2
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	82	103	1
	99	-	-	1	-	2	-	-	1	-	4	-	-	-	80	93	90	4
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	99	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	40%	00%	00%	-88%
'94	00%	00%	00%	+67%
'99	50%	17%	17%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	333	Dec:	0%
	'94	40		50%
	'99	120		17%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	5	-	-	-	-	-	3	-	-	8	-	-	-	533			8
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
Y	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	18	-	-	-	-	-	-	-	-	18	-	-	-	360			18
M	88	15	3	1	-	-	-	-	-	-	19	-	-	-	1266	16	22	19
	94	53	1	-	-	-	-	-	-	-	53	1	-	-	1080	28	35	54
	99	60	41	-	-	-	-	-	-	-	98	-	3	-	2020	23	33	101
D	88	5	1	-	-	-	-	-	-	-	5	-	-	1	400			6
	94	33	2	-	-	-	-	-	-	-	26	-	-	9	700			35
	99	7	1	-	-	-	-	-	-	-	5	-	2	1	160			8
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	760			38
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	880			44

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	14%	04%	04%	- 2%
'94	03%	00%	10%	+28%
'99	33%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1866	Dec:		21%
'94	1820			38%
'99	2540			6%

Cercocarpus ledifolius																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	2	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	76	53	0
	99	-	1	-	-	-	1	-	1	-	3	-	-	-	60	15	20	3
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	50%	25%	00%	+20%
'99	20%	20%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	0%
'94	80		25%
'99	100		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus montanus																		
S	88	15	-	-	-	-	-	5	-	-	20	-	-	-	1333			20
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	2	-	-	2	-	-	-	40			2
Y	88	8	3	-	-	-	-	1	-	-	12	-	-	-	800			12
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	3	6	2	-	4	-	-	-	-	15	-	-	-	1000	51	58	15
	94	6	4	-	-	-	-	-	-	-	10	-	-	-	200	55	60	10
	99	-	6	-	-	2	4	-	-	-	12	-	-	-	240	50	54	12
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	1	-	-	3	-	-	-	3	-	-	1	80			4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	48%	07%	00%	-88%
'94	45%	00%	00%	+31%
'99	50%	50%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1800	Dec:		0%
'94	220			9%
'99	320			25%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	10	-	-	-	-	-	1	-	-	11	-	-	-	733			11
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	88	8	1	-	-	-	-	1	-	-	10	-	-	-	666	8	11	10
	94	25	2	1	-	-	-	2	-	-	27	-	3	-	600	20	28	30
	99	25	-	-	-	-	-	-	-	-	25	-	-	-	500	11	14	25
D	88	2	1	-	-	-	-	-	-	-	2	-	-	1	200			3
	94	2	-	-	-	-	-	-	-	-	-	-	2	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	08%	00%	04%	-60%
'94	06%	03%	16%	- 9%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1599	Dec:		13%
'94	640			6%
'99	580			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	88	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	10	1	-	-	-	-	-	-	-	9	-	2	-	733			11
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	12	-	-	-	-	-	-	-	-	11	-	1	-	800	3	4	12
	94	11	-	-	-	-	-	-	-	-	11	-	-	-	220	5	5	11
	99	19	-	-	-	-	-	-	-	-	19	-	-	-	380	7	9	19
D	88	3	-	-	-	-	-	-	-	-	2	-	-	1	200			3
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	04%	00%	15%	-77%
'94	00%	00%	00%	- 5%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1733	Dec:	12%
	'94	400		15%
	'99	380		0%

Leptodactylon pungens																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	27	-	-	-	-	-	-	-	-	27	-	-	-	540	5	8	27
	99	32	-	-	-	-	-	-	-	-	32	-	-	-	640	4	5	32

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+ 3%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	620		-
	'99	640		-

Mahonia repens																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	5	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	88	1	-	-	-	-	-	1	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	26	-	-	-	-	-	1	-	-	15	-	12	-	1800			27
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	88	77	-	-	-	-	-	-	-	-	51	-	26	-	5133	2	4	77
	94	7	-	-	-	-	-	-	-	-	7	-	-	-	140	2	5	7
	99	20	-	-	-	-	-	-	-	-	20	-	-	-	400	2	5	20
D	88	8	-	-	-	-	-	1	-	-	3	-	2	4	600			9
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	39%	-98%
'94	00%	00%	00%	+63%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	7533	Dec:	8%
	'94	180		0%
	'99	480		0%

Pinus edulis

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
S	88	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

Purshia tridentata

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	3	-	-	-	-	-	-	-	4	-	-	-	80	9	16	4
	99	-	-	3	-	-	-	-	-	-	3	-	-	-	60	17	25	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	75%	00%	00%	+ 0%
'99	00%	100%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	80		-
	'99	80		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sambucus racemosa																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	49	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33	52	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

Sclerocactus whipplei																		
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	1	3	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'94	0		-
	'99	0		-

Symphoricarpos oreophilus																		
S	88	1	-	-	-	-	-	3	-	-	4	-	-	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	88	8	3	-	-	-	-	10	-	-	21	-	-	-	1400			21
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	30	-	-	-	-	-	-	-	-	30	-	-	-	600			30
M	88	2	-	2	-	-	-	-	-	-	4	-	-	-	266	15	9	4
	94	21	3	-	-	-	-	-	-	-	24	-	-	-	480	9	19	24
	99	10	-	-	3	-	-	-	-	-	13	-	-	-	260	14	22	13

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	12%	08%	00%	-70%
'94	12%	00%	00%	+42%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1666	Dec:	-
	'94	500		-
	'99	860		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	10	11	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	24	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	0		-

Trend Study 16C-25-99

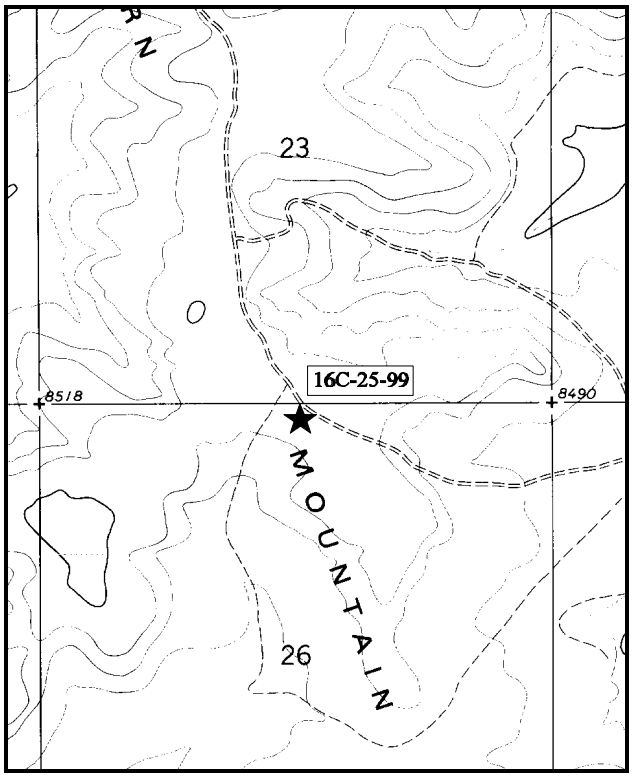
Study site name: South Horn 1/4 Corner . Range type: Big Sagebrush - Grass .

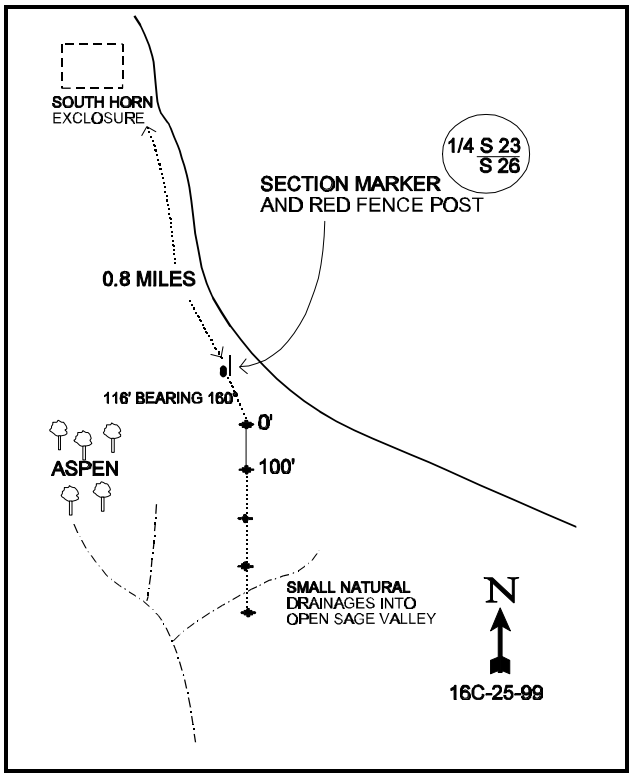
Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the South Horn exclosure (by study #16C-24), continue south on the main USGS road to a USGS landline marker by a tall red fencepost on the right side of the road. This is the witness post for the transect. From the witness post walk SE (145°M) for 116 feet to the 0-foot end of the baseline. The 18" green fencepost is marked by browse tag #9011.





Map Name: The Cap

Diagrammatic Sketch

Township l9S , Range 6E , Section 26

UTM 4332840.865 N, 481397.347 E

DISCUSSION

Trend Study No. 16C-25 (31-23)

The South Horn 1/4 Corner trend study samples an area of mountain big sagebrush/grass which is representative of a large expanse of open sagebrush slopes and flats on South Horn Mountain. On top of this large open plateau, the country is flat or gently rolling. The study is located on a southwest-facing slope (5%) with an elevation of 8,550 feet. The rocky ridges and barren rock outcrops support black sagebrush due to the shallow soils. Down the slope, mountain big sagebrush is dominate on the deeper soils. Elk utilize this area in winter and into early spring. Scattered clumps of pinyon-juniper and Utah serviceberry offer cover and forage, with a stand of aspen 300 yards to the west. The Forest Service permits for summer cattle grazing as part of the Horn Mountain allotment. On this particular site, there is little sign of cattle because there is little water available in the summer. Pellet group data from 1999 estimate 9 deer, 71 elk, and 3 cow days use/acre (22 ddu/ha, 175 edu/ha, 7 cdu/ha). All of the cow pats were old. Deer and elk pellet groups appeared to be from the previous winter.

The soil is relatively shallow with an estimated effective rooting depth of just over 12 inches. At that depth there is a clay/sand hardpan layer that could restrict root development. Soil texture is a sandy loam with a neutral pH (6.8). Parent material is sandstone. Phosphorus is limited at just 2.5 ppm. Values less than 10 ppm can limit normal plant growth and development. There is some localized soil movement evident, although there are no active gullies and herbaceous vegetation cover is abundant. There was a high intensity thunderstorm during the 1999 reading which deposited an estimated quarter inch or more of water in about 30 minutes. Puddled rain water drained into the soil within 5 minutes after the rain stopped.

The dominant browse species is mountain big sagebrush, although this may be a marginal site for it. There is also a few black sagebrush mixed in. There were an estimated 10,132 mountain big sagebrush plants/acre reported in 1988. In 1994, the baseline was lengthened to provide a much larger sample. The density of mountain big sagebrush was estimated at 4,140 plants/acre. This larger sample is largely responsible for the differences in population densities between 1988 and 1994. Density increased to 4,840 plants/acre by 1999, partly due to the large increase in young age class. The mountain big sagebrush is heavily hedged, especially near the top of the slope. However, this is where site potential would also be at its lowest. Vigor was poor and percent decadence high in 1994 at 58%. Conditions have improved since then and in 1999, vigor is normal, recruitment improved, percent decadence has declined to 13%, and young age class has increased to 21%.

Dwarf rabbitbrush is an abundant, predominately mature population that shows light use. Smaller shrubs and half-shrubs like prickly phlox and low rabbitbrush are fairly common but seldom utilized as forage. A few Utah serviceberry, were sampled and displayed only light hedging and good vigor. Other species on the site include Pediocactus, snowberry, fringed sagebrush, broom snakeweed, and gray horsebrush. All are present in low densities and do not provide much cover or forage.

The herbaceous understory is moderately abundant and diverse. Mutton and Sandberg bluegrass are the most common species. Some of the changes in frequency between these two species appears to be due to problems with identification between 1994 and 1999. The next dominant grass is needle-and-thread grass followed by prairie junegrass, both of which significantly decreased in nested frequency since 1994. The forb population is exceptionally diverse. Twenty five species were identified in 1994 and 27 in 1999. The most common species include tapertip hawksbeard, Eaton fleabane, hairy golden aster, penstemon, and desert phlox.

1994 TREND ASSESSMENT

Bare ground has remained about the same since 1988, while litter cover has decreased. However, soil trend is still considered stable. The mountain big sagebrush population has greatly decreased since 1988, but most of

the change is due to the lengthening of the baseline to get a more representative sample for browse species. Fifty seven percent of the population is now decadent which is an increase from 44% in 1988. More of the plants have been heavily hedged and show reduced vigor. The black sagebrush population also has a high percent of decadent plants at 45%. Trend for browse is down. Summed nested frequency for grasses and forbs combined has decreased greatly since 1988. Most of the decrease is from the forb composition while grasses actually increased slightly. Herbaceous understory trend is down for forbs but stable for grasses.

TREND ASSESSMENT
soil - stable
browse - down
herbaceous understory - overall, slightly down; down for forbs but stable for grasses

1999 TREND ASSESSMENT

Trend for soil continues to be stable. Percent cover for bare ground has declined, although litter cover is also down compared to 1994 estimates. Total vegetative cover has increased from 26% to 33%. Trend for the key browse species, mountain big sagebrush, is up. Use is heavier, yet vigor and recruitment have improved, and percent decadence has declined from 58% to 13%. Trend for the herbaceous understory down slightly for grasses and stable for forbs. Cover or grasses and forbs have increased nearly two fold compared to 1994. The most abundant grass, mutton bluegrass, has remained stable, but Sandberg bluegrass declined significantly in frequency. Overall, the herbaceous trend is considered stable.

TREND ASSESSMENT
soil - stable
browse - up
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 25

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron trachycaulum	-	-	5	-	-	2	-	.03
G	Bouteloua gracilis	9	26	15	3	10	7	.39	.40
G	Carex spp.	a-	a-	b14	-	-	7	-	.42
G	Elymus salina	19	8	25	9	3	10	.33	.47
G	Koeleria cristata	b91	b66	a37	37	34	16	.42	.95
G	Oryzopsis hymenoides	-	2	3	-	1	2	.00	.15
G	Poa fendleriana	304	192	190	104	73	69	3.29	6.55
G	Poa secunda	a14	c200	b131	6	75	53	1.75	1.45
G	Sitanion hystrix	52	44	51	23	19	21	.22	.64
G	Stipa comata	b143	b118	a53	59	48	24	2.07	.96
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		632	656	524	241	263	211	8.49	12.04
Total for Grasses		632	656	524	241	263	211	8.49	12.04
F	Allium spp.	b14	a-	a-	6	-	-	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
F	Antennaria microphylla	4	-	-	1	-	-	-	-
F	Arabis spp.	$_{b}$73	$_{a}$12	$_{a}$18	33	5	8	.03	.04
F	Astragalus convallarius	-	5	6	-	2	2	.15	.18
F	Aster spp.	1	-	-	1	-	-	-	-
F	Astragalus spp.	1	4	4	1	2	1	.03	.03
F	Castilleja chromosa	$_{c}$183	$_{b}$36	$_{a}$-	78	16	-	.15	-
F	Castilleja linariaefolia	$_{a}$3	$_{a}$6	$_{b}$22	1	4	12	.02	.62
F	Cirsium calcareum	-	-	1	-	-	1	-	.03
F	Crepis acuminata	$_{b}$169	$_{a}$55	$_{a}$64	72	29	34	.30	2.25
F	Cryptantha spp.	$_{b}$51	$_{a}$7	$_{a}$1	25	4	1	.04	.00
F	Delphinium nuttallianum	$_{b}$14	$_{b}$9	$_{a}$-	6	5	-	.02	-
F	Draba spp. (a)	-	3	-	-	1	-	.00	-
F	Eriogonum alatum	-	15	17	-	7	6	.06	.18
F	Erigeron eatonii	113	113	125	38	46	58	.80	1.80
F	Erigeron pumilus	$_{a}$16	$_{b}$48	$_{a}$10	9	21	5	.18	.07
F	Eriogonum racemosum	$_{a}$19	$_{b}$42	$_{ab}$33	10	22	19	.19	.76
F	Eriogonum umbellatum	$_{b}$166	$_{a}$15	$_{a}$28	67	8	15	.35	.61
F	Gilia spp. (a)	-	6	3	-	2	1	.01	.03
F	Heterotheca villosa	$_{a}$-	$_{a}$3	$_{b}$36	-	1	14	.15	1.74
F	Linum lewisii	1	-	-	1	-	-	-	-
F	Lithospermum ruderale	8	1	2	4	1	1	.00	.00
F	Machaeranthera grindelioides	22	26	11	8	13	7	.09	.40
F	Penstemon humilis	$_{b}$36	$_{b}$37	$_{a}$4	18	16	1	.66	.15
F	Penstemon spp.	$_{a}$-	$_{a}$-	$_{b}$58	-	-	28	-	1.83
F	Phlox austromontana	$_{b}$121	$_{a}$74	$_{a}$99	48	34	37	1.49	2.34
F	Phlox longifolia	-	1	-	-	1	-	.00	-
F	Polygonum douglasii (a)	-	12	6	-	6	3	.05	.01
F	Potentilla gracilis	$_{a}$-	$_{a}$-	$_{b}$7	-	-	3	-	.06
F	Schoencrambe linifolia	-	-	3	-	-	1	-	.03
F	Senecio integerrimus	$_{a}$-	$_{b}$6	$_{b}$8	-	3	4	.04	.04
F	Senecio multilobatus	23	15	12	11	7	6	.03	.03
F	Townsendia spp.	2	-	-	1	-	-	-	-
F	Trifolium spp.	$_{b}$75	$_{a}$21	$_{a}$5	39	14	3	.09	.01
F	Zigadenus paniculatus	$_{b}$15	$_{a}$-	$_{a}$1	7	-	1	-	.00
Total for Annual Forbs		0	21	9	0	9	4	0.07	0.04
Total for Perennial Forbs		1130	551	575	485	261	268	4.94	13.27
Total for Forbs		1130	572	584	485	270	272	5.01	13.32

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 25

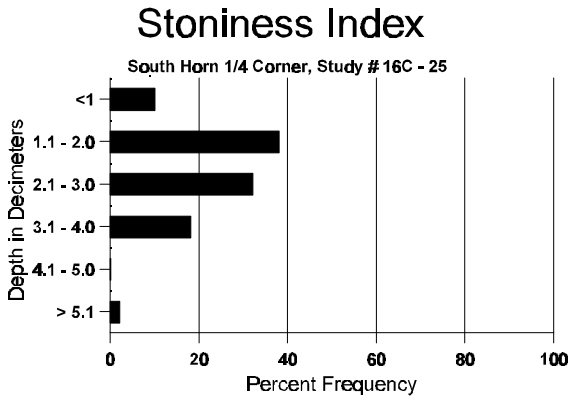
Type	Species	Strip Frequency ⁄94	⁄99	Average Cover % ⁄94	⁄99
B	Amelanchier utahensis	5	2	1.18	-
B	Artemisia frigida	1	2	-	-
B	Artemisia nova	-	2	-	.30
B	Artemisia tridentata vaseyana	91	79	7.42	8.57
B	Ceratoides lanata	0	3	-	-
B	Chrysothamnus depressus	50	49	1.20	1.92
B	Chrysothamnus viscidiflorus	31	28	.46	.60
B	Eriogonum corymbosum	-	-	.03	-
B	Gutierrezia sarothrae	18	15	.21	.19
B	Leptodactylon pungens	32	24	.51	.61
B	Pediocactus simpsonii	1	1	.00	-
B	Symphoricarpos oreophilus	3	3	.15	-
B	Tetradymia canescens	6	5	.03	.15
Total for Browse		238	213	11.24	12.06

BASIC COVER --
Herd unit 16C, Study no: 25

Cover Type	Nested Frequency ⁄94	⁄99	Average Cover % '88	'94	'99
Vegetation	335	330	12.50	25.56	32.70
Rock	69	58	.25	.42	3.50
Pavement	85	139	1.50	.37	1.58
Litter	391	350	44.25	33.93	24.04
Cryptogams	118	161	4.00	2.63	3.77
Bare Ground	345	319	37.50	38.25	33.43

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 25, Study Name: South Horn 1/4 Corner

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.5	55.6 (12.9)	6.8	57.4	28.7	13.8	1.3	2.5	115.2	0.5



PELLET GROUP DATA --
Herd unit 16C, Study no: 25

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	23	14	n/a
Elk	38	34	71 (175)
Deer	6	19	9 (22)
Cattle	-	3	3 (7)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 25

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	8	1	-	-	-	-	-	-	-	9	-	-	-	180	27	36	9
	99	-	1	1	-	-	-	-	-	-	2	-	-	-	40	36	45	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	11%	00%	00%	-78%
'99	50%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	0		-
	'94	180		-
	'99	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia frigida																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	7	1
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	9	9	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+50%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	40		-

Artemisia nova																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	18	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	88	21	18	4	7	-	-	-	-	-	50	-	-	-	3333			50
	94	7	4	3	-	-	-	-	-	-	14	-	-	-	280			14
	99	9	15	25	-	-	1	-	-	-	50	-	-	-	1000			50
M	88	16	13	5	-	-	-	-	-	-	33	-	1	-	2266	10	13	34
	94	54	24	5	-	-	-	-	-	-	83	-	-	-	1660	12	22	83
	99	4	37	74	-	10	36	-	-	-	159	-	2	-	3220	16	25	161
D	88	36	19	12	1	-	-	-	-	-	54	-	9	5	4533			68
	94	60	19	33	-	-	-	-	-	-	36	-	-	75	2240			112
	99	-	9	16	-	1	5	-	-	-	19	-	2	10	620			31
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1120			56
	99	1	-	-	-	-	-	-	-	-	-	-	-	-	720			36

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	33%	14%	10%	-59%
'94	22%	20%	36%	+14%
'99	30%	65%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	10132	Dec:	45%
	'94	4180		54%
	'99	4840		13%

Ceratoides lanata																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	3	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	60%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	100		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	10	12	6	-	-	-	-	-	-	28	-	-	-	1866			28
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	88	17	1	3	-	-	-	3	-	-	24	-	-	-	1600	3	5	24
	94	101	14	2	5	-	-	-	-	-	122	-	-	-	2440	3	7	122
	99	139	7	-	-	-	-	-	-	-	146	-	-	-	2920	3	8	146
D	88	12	1	1	-	-	-	-	-	-	9	-	5	-	933			14
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	21%	15%	08%	-43%
'94	11%	02%	00%	+18%
'99	05%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	4399	Dec:	21%
	'94	2500		2%
	'99	3060		1%

Chrysothamnus viscidiflorus																		
Y	88	12	2	5	-	-	-	-	-	-	19	-	-	-	1266			19
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	88	5	1	-	-	-	-	-	-	-	6	-	-	-	400	6	6	6
	94	50	9	-	-	-	-	-	-	-	59	-	-	-	1180	5	8	59
	99	60	-	-	-	-	-	-	-	-	60	-	-	-	1200	6	9	60

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	12%	20%	00%	-28%
'94	15%	00%	00%	+ 5%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1666	Dec:	-
	'94	1200		-
	'99	1260		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133	3	4	2
	94	29	-	-	-	-	-	-	-	-	29	-	-	-	580	4	6	29
	99	32	-	-	-	-	-	-	-	-	32	-	-	-	640	5	7	32
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+54%
'94	00%	00%	00%	+22%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	266	Dec:	-
	'94	580		-
	'99	740		-

Leptodactylon pungens																		
S	88	5	-	-	-	-	-	2	-	-	7	-	-	-	466			7
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	24	-	-	-	-	-	2	-	-	26	-	-	-	1733			26
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	88	107	1	-	3	-	-	-	-	-	111	-	-	-	7400	4	4	111
	94	59	-	-	7	-	-	-	-	-	66	-	-	-	1320	3	6	66
	99	60	-	-	-	-	-	-	-	-	60	-	-	-	1200	4	5	60
D	88	7	-	-	-	-	-	-	-	-	5	-	-	2	466			7
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	.69%	00%	01%	-86%
'94	00%	00%	00%	- 4%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	9599	Dec:	5%
	'94	1380		3%
	'99	1320		0%

Pediocactus simpsonii																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	1	2	1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	1	-	-	-	-	-	-	-	1	-	-	1	40	13	28	2
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80	13	20	4
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	25%	00%	25%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	80		50%
	'99	80		0%

Tetradymia canescens																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	5	2	-	-	-	-	-	-	-	7	-	-	-	140	4	6	7
	99	2	2	-	-	-	-	-	-	-	4	-	-	-	80	6	8	4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	22%	00%	00%	-44%
'99	40%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	180		-
	'99	100		-

Trend Study 16C-26-99

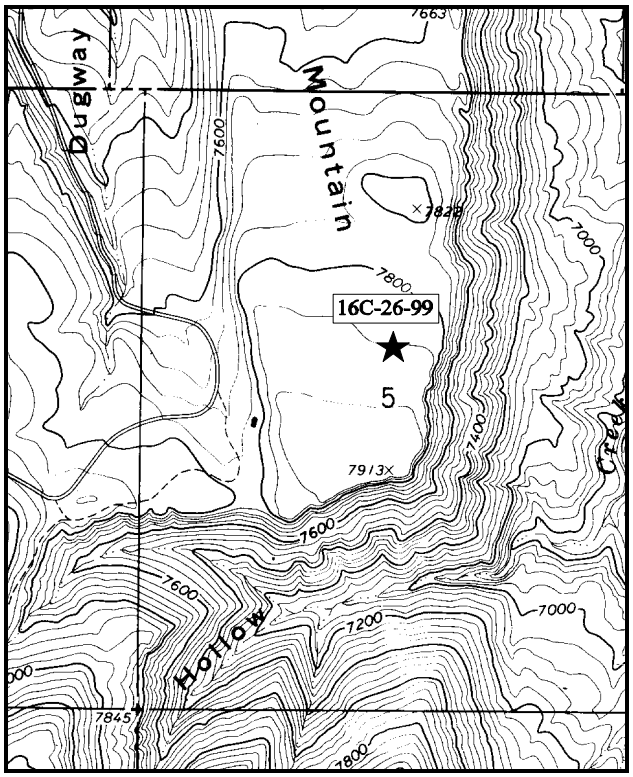
Study site name: Dry Mountain . Range type: Chained, Seeded P-J .

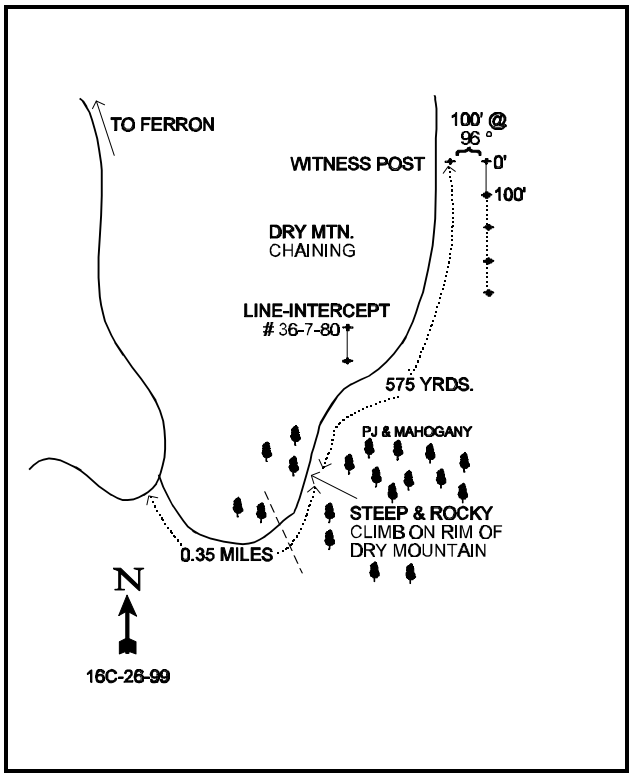
Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of Highway U-10 and Canyon Road in Ferron, proceed west up Ferron Canyon toward Ferron Reservoir for 12.85 miles. At this point, bear left (SE) and go 0.35 mile to the base of Dry Mountain, where the road becomes impassably steep and rocky. From the top of this steep section, hike north down the road approximately 575 yards to a witness post on the right side of the road. From the witness post walk east about 100 feet to the 0-foot baseline stake. The study stakes are short green fenceposts.





Map Name: Flagstaff Peak Diagrammatic Sketch

Township 20S , Range 6E , Section 5 UTM 4328948.015 N, 476649.171 E

DISCUSSION

Trend Study No. 16C-26 (31-24)

The Dry Mountain study site is on the north-facing Dry Mountain plateau which provides excellent winter range for deer and elk in mild to normal winters. The plateau was chained and seeded in 1967 and now supports a vigorous stand of mountain big sagebrush and antelope bitterbrush. Along the edges are mature pinyon-juniper and curlleaf mountain mahogany populations. The trend site has a gentle 5% slope and a north aspect. The whole plateau slopes to the north, and ends in high cliffs above Ferron Creek. The only access is on the south end. Elevation is 7,850 feet. Deer pellet groups are abundant while elk sign is scarce. There is little cattle sign on this part of the Ferron grazing allotment. Summer cattle use is restricted by the lack of water and access to the plateau. Pellet group data from 1999 estimate 72 deer, 1 elk and 2 cow days use/acre (178 ddu/ha, 3 edu/ha, and 5 cdu/ha). About 90% of the deer pellet groups encountered were from the previous winter and the remainder from this spring. Rabbit pellets are very abundant.

The soil is very sandy and moderately deep, but sandstone bedrock is found at an average depth of 14 inches. There are scattered sandstone rock outcrops near the 0 ft stake. The soil has a loamy sand texture with a neutral to slightly alkaline pH (7.3). Phosphorus and potassium are limited at 2.9 and 41.6 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium have been found to limit normal plant growth and development. Erosion is slight due to good vegetative, litter cover, and lack of significant slope. There are few rocks or pavement on the surface.

Both mountain big sagebrush and antelope bitterbrush are abundant on the site and provide valuable forage. Mountain big sagebrush is the most abundant shrub with a density of 7,199 plants/acre in 1988, 3,840 in 1994, and 3,940 by 1999. Most of the differences in population density between 1988 and 1994 is due to the much larger sample taken in 1994 and 1999, but some of the change is due to the lack of young plants being sampled in 1994. Seedlings and young sagebrush were numerous in 1988 due to the wet years in the mid 1980's. Most of these plants did not survive the drought years that followed causing a large decline in population densities. The number of mature sagebrush on the site have remained fairly stable (3,000 in 1988 to 2,880 in 1999) and the number of decadent plants actually declined from 2,266 in 1988 to 860 by 1999. Currently (‘99) mountain big sagebrush provides 69% of the browse cover. Mature plants comprise 73% of the population and generally have a moderately hedged form. Vigor is normal and percent decadence is 22%.

The highly palatable antelope bitterbrush is moderately abundant and currently (‘99) produces 14% of the browse cover. It displayed mostly moderate use in 1988 and 1994, with more heavy utilization in 1999. Estimated density was 1,500 plants/acre in 1994, increasing slightly to 1,720 by 1999. Vigor is normal and percent decadence low. Rabbitbrush is also present and exhibits a mature population. Juniper and pinyon tree density in 1994 was estimated at 52 and 25 trees/acre respectively according to point-center quarter data. In 1999, many pinyon and juniper trees were cut down as part of a chainsaw chaining maintenance treatment. Point quarter data estimates surviving trees at 9 trees/acre for juniper and 13 for pinyon. Average diameter of juniper is 6.6 inches while that of pinyon is 2.2 inches.

The understory is diverse but not very abundant due to the dominance of shrubs. The most abundant grass species include, western wheatgrass, blue grama, and needle-and-thread. Eleven species of forbs were identified in 1994, and 17 in 1999. Combined, forbs account for less than 1% cover in 1994 and 3% in 1999. The only common species sampled in 1999 was lobeleaf groundsel.

1994 TREND ASSESSMENT

Litter cover has decreased from 70% in 1988 to 47% in 1994. Bare ground has increased to 24% with signs of only slight erosion. Vegetative cover almost entirely from browse, with sum of nested frequency for

herbaceous plants down. Trend for soil is considered down slightly. Although the total mountain big sagebrush population has decreased, the mature population is apparently stable. Most of the decrease is due to high numbers of young plants sampled in 1988 and the much larger sample size used in 1994. The rate of decadency is moderately high and there is reduced vigor on the decadent plants. Mature antelope bitterbrush have increased in density but the population shows increased decadency (13% to 23%). This is still low for a bitterbrush stand. Overall browse trend is stable. There is a poor composition of forbs and they offer very little forage. Grasses dominant the herbaceous understory. Sum of nested frequency of perennial grasses has remained stable while the sum of nested frequency for perennial forbs has declined. Overall the herbaceous understory trend is slightly down.

TREND ASSESSMENT
soil - down slightly
browse - stable
herbaceous understory - slightly down

1999 TEND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1994. Trend for browse is up slightly for the key species, mountain big sagebrush and antelope bitterbrush. Mountain big sagebrush displays a stable population with mostly moderate use, improved vigor, and reduced decadence. Bitterbrush shows more heavy use, but improved recruitment and reduced decadence. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has declined slightly, while nested frequency of perennial forbs has increased dramatically. Overall trend for the herbaceous understory is considered stable.

TREND ASSESSMENT
soil - stable
browse - up slightly
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 26

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron smithii	105	98	68	47	40	36	.35	.40
G	Bouteloua gracilis	64	47	42	24	18	17	1.86	1.60
G	Carex spp.	1	4	4	1	2	2	.03	.15
G	Elymus salina	-	-	3	-	-	1	-	.03
G	Oryzopsis hymenoides	$_{a}$6	$_{b}$26	$_{ab}$16	2	10	7	.69	.43
G	Poa fendleriana	12	15	10	5	5	4	.05	.02
G	Sitanion hystrix	$_{a}$-	$_{b}$11	$_{b}$6	-	5	4	.02	.02
G	Sporobolus cryptandrus	3	3	2	2	1	1	.00	.15
G	Stipa comata	$_{b}$117	$_{ab}$97	$_{a}$75	50	40	32	1.76	1.34
G	Stipa lettermani	-	-	6	-	-	2	-	.18
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		308	301	232	131	121	106	4.78	4.34

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
Total for Grasses		308	301	232	131	121	106	4.78	4.34
F	Androsace septentrionalis (a)	-	$_{a}$-	$_{b}$14	-	-	8	-	.06
F	Antennaria spp.	2	-	-	1	-	-	-	-
F	Arabis spp.	$_{b}$23	$_{a}$3	$_{b}$22	11	2	11	.01	.05
F	Arabis perennans	$_{b}$13	$_{a}$1	$_{a}$-	6	1	-	.00	-
F	Astragalus convallarius	2	-	-	2	-	-	-	-
F	Aster spp.	$_{a}$-	$_{a}$-	$_{b}$30	-	-	14	-	.17
F	Astragalus spp.	-	1	4	-	1	2	.00	.03
F	Chaenactis douglasii	12	3	16	6	2	7	.01	.08
F	Crepis acuminata	4	-	1	2	-	1	-	.00
F	Cryptantha spp.	$_{a}$-	$_{b}$15	$_{b}$27	-	8	12	.09	.72
F	Descurainia pinnata (a)	-	-	1	-	-	1	-	.00
F	Erigeron pumilus	$_{a}$3	$_{a}$-	$_{b}$15	1	-	8	-	.14
F	Eriogonum racemosum	4	2	3	3	2	2	.01	.04
F	Gaillardia pinnatifida	-	1	-	-	1	-	.00	-
F	Gayophytum ramosissimum (a)	-	2	-	-	1	-	.00	-
F	Ipomopsis aggregata	-	-	1	-	-	1	-	.00
F	Lygodesmia spp.	-	1	3	-	1	1	.03	.15
F	Machaeranthera canescens	$_{a}$-	$_{a}$-	$_{b}$11	-	-	5	-	.08
F	Oenothera spp.	3	-	1	1	-	1	-	.00
F	Polygonum douglasii (a)	-	3	-	-	1	-	.00	-
F	Schoencrambe linifolia	22	23	12	10	11	7	.08	.03
F	Senecio multilobatus	$_{b}$36	$_{a}$10	$_{c}$118	17	6	54	.06	1.24
F	Trifolium spp.	-	-	2	-	-	2	-	.01
Total for Annual Forbs		0	5	15	0	2	9	0.00	0.07
Total for Perennial Forbs		124	60	266	60	35	128	0.31	2.77
Total for Forbs		124	65	281	60	37	137	0.31	2.84

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 26

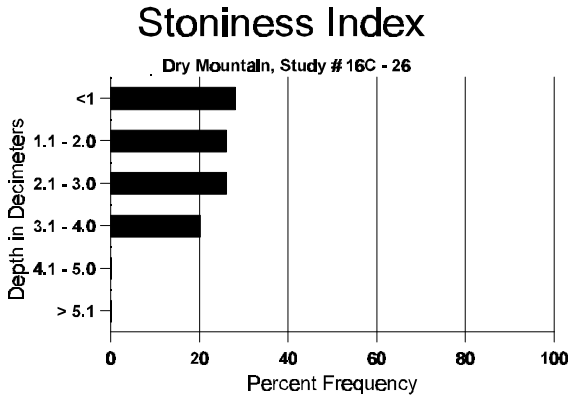
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Artemisia tridentata vaseyana	88	86	19.94	21.67
B	Chrysothamnus viscidiflorus	53	55	1.53	2.07
B	Echinocereus triglochidatus	0	4	-	-
B	Gutierrezia sarothrae	7	8	.00	.02
B	Juniperus osteosperma	0	0	.66	-
B	Leptodactylon pungens	19	18	.13	.25
B	Opuntia spp.	5	9	-	.05
B	Pinus edulis	0	3	.44	.18
B	Purshia tridentata	43	51	5.56	7.15
Total for Browse		215	234	28.28	31.39

BASIC COVER --
Herd unit 16C, Study no: 26

Cover Type	Nested Frequency '94	'99	Average Cover % '88	'94	'99
Vegetation	261	255	5.75	37.89	34.27
Rock	60	48	2.25	2.88	3.32
Pavement	30	38	.25	.52	.63
Litter	382	361	69.50	46.47	49.09
Cryptogams	92	76	2.50	3.01	2.12
Bare Ground	243	243	19.75	24.49	26.34

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 26, Study Name: Dry Mountain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.0	53.4 (14.0)	n/a	83.6	5.8	10.6	1.0	2.9	41.6	0.7



PELLET GROUP DATA --
Herd unit 16C, Study no: 26

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	21	42	n/a
Elk	2	-	1 (2)
Deer	64	34	72 (178)
Cattle	-	-	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 26

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	14	-	-	-	-	-	1	-	-	15	-	-	-	1000			15
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	15	12	2	-	-	-	-	-	-	29	-	-	-	1933			29
	94	2	2	-	-	-	-	-	-	-	3	-	-	1	80			4
	99	7	-	-	1	-	-	2	-	-	10	-	-	-	200			10
M	88	8	31	6	-	-	-	-	-	-	44	1	-	-	3000	19	29	45
	94	77	39	6	-	-	-	-	-	-	122	-	-	-	2440	20	36	122
	99	45	83	11	3	1	1	-	-	-	144	-	-	-	2880	23	36	144
D	88	11	23	-	-	-	-	-	-	-	32	-	-	2	2266			34
	94	18	39	9	-	-	-	-	-	-	26	-	-	40	1320			66
	99	12	18	5	2	2	2	2	-	-	34	-	1	8	860			43
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	380			19
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	700			35

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	61%	07%	02%	-47%
'94	42%	08%	21%	+ 3%
'99	53%	10%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	7199	Dec:	31%
	'94	3840		34%
	'99	3940		22%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
Y	88	18	-	-	-	-	-	1	-	-	19	-	-	-	1266			19
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	14	-	-	2	-	-	1	-	-	17	-	-	-	340			17
M	88	52	-	-	-	1	-	1	-	-	54	-	-	-	3600	8	9	54
	94	85	9	3	-	-	-	-	-	-	97	-	-	-	1940	11	14	97
	99	70	9	-	7	1	-	-	-	-	87	-	-	-	1740	14	16	87
D	88	1	-	-	-	-	1	1	-	-	3	-	-	-	200			3
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	01%	01%	00%	-61%
'94	09%	03%	01%	+ 8%
'99	09%	00%	.94%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	5066	Dec:	4%
	'94	1960		1%
	'99	2120		2%

Echinocereus triglochidatus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	1	3	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	80		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	17	-	-	-	-	-	-	-	-	17	-	-	-	340	5	6	17
	99	14	-	-	-	-	-	-	-	-	14	-	-	-	280	7	6	14

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+10%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	360		-
	'99	400		-

Juniperus osteosperma																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Leptodactylon pungens																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
Y	88	12	-	-	-	-	-	2	-	-	14	-	-	-	933			14
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	9	-	-	1	-	-	1	-	-	11	-	-	-	220			11
M	88	20	-	-	-	-	-	2	-	-	22	-	-	-	1466	5	5	22
	94	40	-	-	-	-	-	-	-	-	40	-	-	-	800	6	6	40
	99	31	-	-	5	-	-	1	-	-	36	-	1	-	740	5	7	37
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	2	-	-	2	80			4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-68%
'94	00%	00%	00%	+23%
'99	00%	00%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	2465	Dec:	3%
	'94	800		0%
	'99	1040		8%

Opuntia spp.																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200	2	2	3
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100	3	11	5
	99	10	-	-	-	-	-	-	-	-	10	-	-	-	200	2	6	10
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-40%
'94	00%	00%	00%	+57%
'99	00%	00%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	200	Dec:	0%
	'94	120		0%
	'99	280		7%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
S	88	-	-	-	-	-	-	2	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	2	-	1	-	60			3
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	33%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	266	Dec:	-
	'94	0		-
	'99	60		-

Purshia tridentata																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
Y	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	9	3	3	-	-	-	2	-	-	17	-	-	-	340			17
M	88	1	8	-	-	-	-	-	-	-	9	-	-	-	600	14	28	9
	94	21	30	5	-	-	-	-	-	-	56	-	-	-	1120	15	40	56
	99	35	6	13	3	1	3	-	-	-	61	-	-	-	1220	19	39	61
D	88	-	2	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	9	8	-	-	-	-	-	-	-	13	-	-	4	340			17
	99	5	-	-	2	-	1	-	-	-	7	-	-	1	160			8
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	240			12

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	67%	00%	00%	+33%
'94	51%	07%	05%	+13%
'99	12%	23%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	999	Dec:	13%
	'94	1500		23%
	'99	1720		9%

Trend Study 16C-27-99

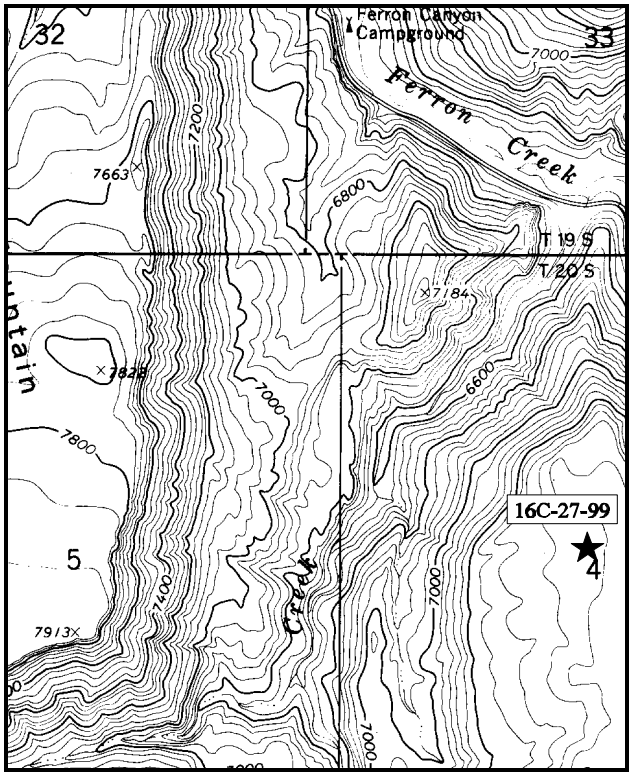
Study site name: Birch Creek Chaining . Range type: Chained, Seeded, P-J .

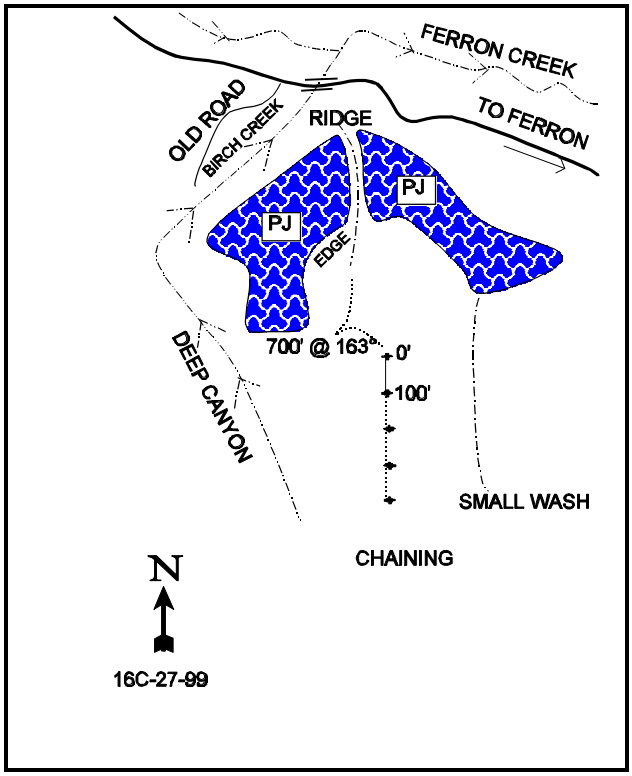
Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Ferron, go west up the Ferron Canyon Road approximately 8.5 miles, past Millsite Reservoir and the FS boundary, to a bridge over Birch Creek, a tributary of Ferron Creek (2.1 miles from forest boundary). The Birch Creek chaining is located on top of the bench to the south. The easiest way to the study site is to hike up along the steep and rocky ridge to the P-J on top. Continue south up through the P-J to the edge of the chaining. The study site is in the middle of the chaining, marked by 18" fenceposts. From the highest point along the edge of the P-J, walk south (163°)for 146 paces to the 0-foot baseline stake. This stake is marked by browse tag #9026.





Map Name: Flagstaff Peak

Diagrammatic Sketch

Township 20S , Range 6E , Section 4

UTM 4328633.358 N, 478415.943 E

DISCUSSION

Trend Study No. 16C-27 (31-25)

The Birch Creek Chaining trend study is located on the remote, north end of a bench on Forest Service land above Ferron Creek. A large area was chained, trenched on contour, and seeded in 1972. Grass is the dominant vegetation over much of the area and browse is limited within the chaining. On this side of the mesa, general exposure is to the west. The terrain is gently sloping (5%). The study is located in the center of the chaining at an elevation of 7,950 feet. Elk and deer pellet groups are moderately abundant. Pellet group data from 1999 estimate 11 deer, 35 elk and 23 cow days use/acre (27 ddu/ha, 87 edu/ha, and 57 cdu/ha). Rabbit pellets are very abundant. Cows were on the site during the 1999 reading (7/27/99) and had heavily utilized much of the grass.

Soil on the site is moderately deep with an effective rooting depth estimated at 15 inches. It is actually deeper, but due to soil compaction, deeper pentrometer readings were not possible. Soil texture is a sandy clay loam with a slightly alkaline pH (7.4). Phosphorus is marginal and potassium limited at 9.6 ppm and 51.2 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium have been shown to limit normal plant growth and development. The surface layer is loose and slightly rocky. A dense stand of grasses provides excellent soil protection, along with abundant well dispersed litter. The well-vegetated trenches prevent most erosion on this gentle slope. The steeper slopes are more closely terraced and no erosion is evident.

Mountain big sagebrush provided 61% of the browse cover in 1994 and 75% in 1999. The population density was estimated at 3,132 plants/acre in 1988 and 3,660 by 1999. They show moderately to heavy use with good vigor and low decadence. Recruitment of seedlings and young have steadily declined since 1988, but there are currently enough young to maintain the population. The only other common browse consist of released pinyon and juniper trees from the original chaining. Twenty percent of the pinyon and 30% of the juniper consist of surviving chained trees. Point quarter data from 1999 estimate 53 pinyon and 76 juniper trees/acre with average diameters of 3.6 and 3.4 inches respectively. Mature stands of pinyon-juniper were left on the edges and steeper slopes. Valuable browse species such as curlleaf and true mountain mahogany, serviceberry, ephedra, and bitterbrush are found on the undisturbed slopes.

Grasses are a very important forage resource on this chained site. Seeded species; crested wheatgrass, intermediate wheatgrass, and smooth brome are the dominate grasses. They accounted for 95% of the grass cover in 1994 and 92% in 1999. Only a few forbs were found and they provide little forage and less than 1/4 of 1% cover.

1994 TREND ASSESSMENT

Bare ground has decreased since 1988 from 29% to 27%. Litter cover has also decreased to only 44% cover with rock and pavement cover combined remained nearly the same. Vegetation cover is split nearly equally between grasses and browse. Soil trend is stable. The key browse is mountain big sagebrush. It displays a stable population with a good reproductive potential (proportion of young) and a low decadency rate. Browse trend is stable. The herbaceous understory trend is slightly down. Sum of nested frequency of both grasses and forbs declined since 1988. Forbs are very rare and offer little to the community. The majority of the grasses are seeded species with a few natives.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - slightly down

1999 TEND ASSESSMENT

Trend for soil is up slightly due to an increase in litter and vegetation cover and a decline in percent cover of bare ground. There is no significant erosion occurring due to the abundant protective ground cover combined with the gentle terrain and the contour furrow treatment. Trend for the key browse species, mountain big sagebrush, is stable. Use is heavier compared to 1994, but vigor is still good, and percent decadence is low at only 13%. Biotic potential and young recruitment has declined steadily since 1988, but there is still adequate numbers of young plants to maintain the population. Trend for the herbaceous understory is up slightly for grasses. Forbs are very limited and none were encountered in 1999. Nested frequency of crested wheatgrass and smooth brome have both increased significantly.

TREND ASSESSMENT
soil - up slightly
browse - stable
herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 27

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron cristatum	$_{a}$159	$_{a}$154	$_{b}$191	58	55	63	8.27	10.18
G	Agropyron intermedium	$_{b}$162	$_{a}$77	$_{a}$56	63	28	22	1.88	.99
G	Bromus inermis	$_{ab}$77	$_{a}$53	$_{b}$90	32	20	33	1.08	1.47
G	Elymus salina	-	2	-	-	1	-	.00	-
G	Oryzopsis hymenoides	37	18	23	16	8	14	.61	1.00
G	Sitanion hystrix	$_{b}$23	$_{a}$3	$_{a}$7	11	1	3	.00	.04
G	Sporobolus cryptandrus	-	1	-	-	1	-	.00	-
G	Stipa pinetorum	$_{b}$9	$_{a}$-	$_{a}$-	5	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		467	308	367	185	114	135	11.88	13.69
Total for Grasses		467	308	367	185	114	135	11.88	13.69
F	Arabis spp.	-	2	-	-	2	-	.03	-
F	Chenopodium glaucum (a)	$_{b}$9	$_{a}$1	$_{a}$-	3	1	-	.00	-
F	Cryptantha spp.	1	-	-	1	-	-	-	-
F	Descurainia pinnata (a)	-	5	-	-	2	-	.01	-
F	Ipomopsis aggregata	3	3	-	1	1	-	.00	-
F	Penstemon caespitosus	5	5	-	2	2	-	.03	-
F	Senecio multilobatus	$_{b}$11	$_{a}$-	$_{a}$-	5	-	-	-	-
Total for Annual Forbs		9	6	0	3	3	0	0.01	0
Total for Perennial Forbs		20	10	0	9	5	0	0.07	0
Total for Forbs		29	16	0	12	8	0	0.09	0

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 27

Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Amelanchier utahensis	0	1	-	-
B	Artemisia tridentata vaseyana	56	68	7.80	11.03
B	Gutierrezia sarothrae	2	5	-	.16
B	Juniperus osteosperma	0	1	2.36	1.62
B	Opuntia spp.	1	1	-	-
B	Pinus edulis	0	2	2.64	1.85
B	Purshia tridentata	0	0	-	-
Total for Browse		59	78	12.81	14.68

CANOPY COVER --
Herd unit 16C, Study no: 27

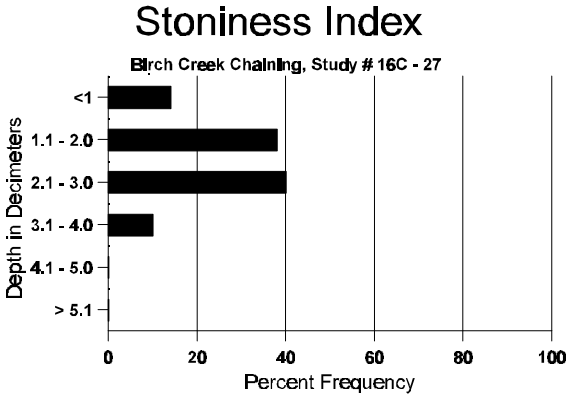
Species	Percent Cover '99
Juniperus osteosperma	2

BASIC COVER --
Herd unit 16C, Study no: 27

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	274	276	2.50	25.13	27.78
Rock	135	72	1.75	2.50	2.96
Pavement	62	128	2.00	.49	1.72
Litter	389	377	65.00	44.10	56.28
Cryptogams	10	8	0	.09	.04
Bare Ground	278	253	28.75	26.70	24.94

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 27, Study Name: Birch Creek Chaining

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.0	n/a	7.4	72.7	5.4	21.8	1.7	9.6	51.2	0.6



PELLET GROUP DATA --
Herd unit 16C, Study no: 27

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	31	40	n/a
Elk	23	18	35 (87)
Deer	24	14	11 (27)
Cattle	-	3	23 (57)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 27

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

Total Plants/Acre (excluding Dead & Seedlings)			%Change	
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	6	2	-	-	-	-	1	-	-	9	-	-	-	600			9
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	11	2	2	-	-	-	1	-	-	16	-	-	-	1066			16
	94	32	3	-	-	-	-	-	-	-	35	-	-	-	700			35
	99	25	2	-	-	-	-	-	-	-	27	-	-	-	540			27
M	88	2	16	7	-	-	-	-	-	-	25	-	-	-	1666	12	18	25
	94	60	30	8	-	-	-	-	-	-	98	-	-	-	1960	17	27	98
	99	58	40	35	-	-	-	-	-	-	133	-	-	-	2660	17	27	133
D	88	-	2	4	-	-	-	-	-	-	4	-	2	-	400			6
	94	-	13	4	-	-	-	-	-	-	15	-	-	2	340			17
	99	13	6	3	1	-	-	-	-	-	19	-	1	3	460			23
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	43%	28%	04%	- 4%
'94	31%	08%	01%	+18%
'99	26%	21%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	3132	Dec:		13%
'94	3000			11%
'99	3660			13%

Gutierrezia sarothrae																		
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	27	11	1
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	7	2
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100	6	7	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-39%
'94	00%	00%	00%	+60%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	66	Dec:	-
'94	40		-
'99	100		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	47	19	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	132	Dec:	-
	'94	0		-
	'99	40		-

Opuntia spp.																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	2	4	1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	11	1
D	88	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	100%	-70%
'94	00%	00%	00%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	100%
	'94	20		0%
	'99	20		0%

Pinus edulis																		
Y	88	3	-	-	-	-	-	1	-	-	3	-	1	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	43	57	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	20%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	332	Dec:	-
	'94	0		-
	'99	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	31	80	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

Trend Study 16C-28-99

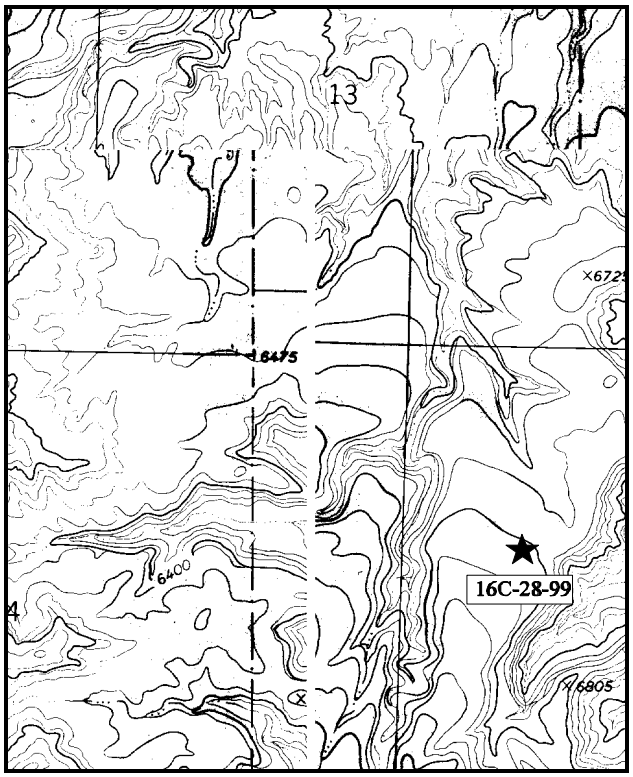
Study site name: South of Dry Wash . Range type: Chained, Seeded P-J .

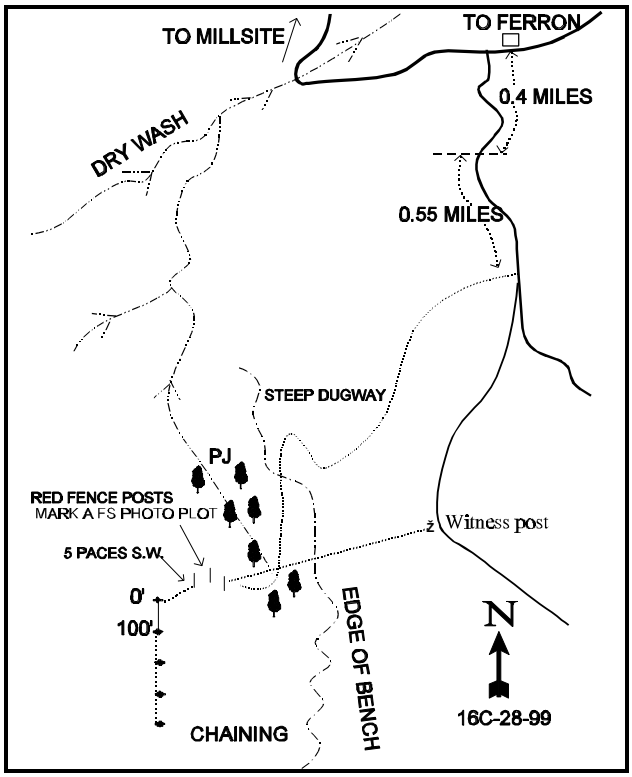
Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the town of Ferron, proceed west up Canyon Road for 3.7 miles. 300 ft after the entrance to Millsite State Park, turn left onto a dirt road. Go south on the dirt road 0.45 miles to a gate. Continue 1.3 miles to a witness post on F.S. Road #118. From the witness post, walk up the ridge to the west. There is a game trail going to the top at a bearing of 238°M. Take this trail southwest along the edge of the chained area. The road continues up into the east edge of the chaining, where FS photo study plots and the trend study are located. The FS study is marked by tall red fenceposts. The range trend study, marked by 2 foot fenceposts, is adjacent.





Map Name: Ferron

Diagrammatic Sketch

Township 20S , Range 6E , Section 24

UTM 4323868.493 N, 482672.847 E

DISCUSSION

Trend Study No. 16C-28 (31-26)

The South of Dry Wash study samples a chaining on a bench below Nelson Mountain, south of Dry Wash. The 35 acre chaining and seeding was done in 1972 as a Forest Service wildlife habitat enhancement project. A rather isolated site, it receives little use by cattle. It produces an abundance of quality forage for wintering big game and appears to be used into the spring by deer. Pellet group data from 1999 estimate 85 deer and 11 elk days use/acre (209 ddu/ha and 27 edu/ha).

The site is on a gentle slope (7%) with a slight north aspect and an elevation of 6,800 feet. Effective rooting depth is estimated at 13 inches, although at about 4 inches in depth a compacted soil horizon is encountered which contains a lot of clay. The soil surface and profile are very rocky. Overall, soil texture is a sandy clay loam with a slightly alkaline pH (7.5). Phosphorus and potassium are low at only 3 ppm and 38.4 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium have been shown to limit normal plant growth and development. Even with the gentle slope, there is a fair amount of soil movement. This erosion causes gullies, sedimentation, and concentrations of erosion pavement in open areas.

Black sagebrush is the most numerous browse species with 3,440 plants/acre estimated in 1994 and 3,800 by 1999. It provided 32% of the browse cover in 1994 and 34% in 1999. These low growing shrubs were moderately to heavily hedged in 1994, while use was light to moderate in 1999. Vigor is generally good but many decadent plants sampled in 1994 and 1999 appeared to be dying. Recruitment has been variable since 1988, but currently (‘99) 8% of the population consists of young plants.

True mountain mahogany is also fairly abundant and produces additional valuable forage. It produced 34% of the browse cover in 1994 and 33% by 1999. The population consists of about 600 plants/acre. Mature mahogany average 4 to 5 feet in height. Available portions of these shrubs show mostly moderate use. Vigor is good and percent decadence low. Green ephedra is another palatable shrub found on the sight. It has been moderately hedged and has good vigor.

Other palatable browse include four-wing saltbush and slender buckwheat. Released pinyon and juniper trees are abundant and currently (‘99) provide 29% of the browse cover. Data from 1999 estimate a density of 185 pinyon and 108 juniper trees/acre. Average diameter of pinyon was estimated at 2 inches while that of juniper was 3.3 inches. Twenty-one percent of the juniper trees sampled were knocked down by the chaining but still living. The knocked down juniper trees had an average diameter of 8.5 inches.

The herbaceous understory is not very abundant. The most common grass is the native Indian ricegrass. It provided 77% of the grass cover in 1994 and 79% in 1999. Individuals were very robust and vigorous in 1999, with mature plants as tall as 17 inches. Salina wildrye, a bunchgrass that is slightly rhizomatous, is present but not abundant. Forbs are rare, typically small, and don’t offer much forage or cover.

1994 TREND ASSESSMENT

Litter cover has decreased but still provides moderate cover to the soil. There is a decrease in rock and pavement cover. Bare ground has increased slightly. Sixty-seven percent of the vegetative cover is provided by browse and 30% of the browse cover is from pinyon and juniper trees which do not provide as much soil protection as cover of herbaceous plants. However, the soil trend is considered stable. Black sagebrush shows an increasing mature population and an increasing decadency rate. True mountain mahogany also shows an increasing mature population, but a decreasing decadency rate. Both species currently have poor recruitment. Browse trend is stable. Herbaceous understory trend is stable as well. Sum nested frequency of grasses has remained constant while forb nested frequency has declined only slightly. The only down side to the trend is the significant decrease in Indian ricegrass combined with the appearance of Salina wildrye, a

poor forage species. The increased sample size taken in 1994 may be responsible for these changes however. The new lengthened baseline likely picked up some Salina wildrye which was formally outside the study area. Forbs combined provide just over 1% cover and have slightly decreased in nested frequency. They provide little forage and are not an important aspect of the vegetative composition.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

1999 TREND ASSESSMENT

The soil trend is up slightly. Percent cover of bare ground has declined from 25% to 19% and litter cover has increased from 39% to 48%. However, there is still some erosion occurring however. Trend for browse is up slightly for the key species black sagebrush. Density has increased slightly, use is lighter, recruitment improved, and percent decadence has declined from 30% to only 17%. True mountain mahogany shows a stable trend. The only negative aspect to the browse trend is the increase in cover of released pinyon and juniper trees. Trend for the herbaceous understory is up slightly but still limited. Sum of nested frequency of perennial grasses increased including a significant increase in the frequency of Indian ricegrass. Nested frequency for perennial forbs declined although they were never very abundant.

TREND ASSESSMENT
soil - up slightly
browse - up slightly
herbaceous understory - up slightly but poor

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 28

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron cristatum	4	5	1	2	2	1	.03	.00
G	Elymus salina	a-	c34	b30	-	15	12	1.88	1.61
G	Oryzopsis hymenoides	b116	a84	ab113	54	39	50	7.11	6.82
G	Sitanion hystrix	20	17	17	12	8	8	.19	.16
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		140	140	161	68	64	71	9.22	8.61
Total for Grasses		140	140	161	68	64	71	9.22	8.61
F	Artemisia ludoviciana	-	3	-	-	1	-	.00	-
F	Cruciferae	b9	b5	a-	5	3	-	.01	-
F	Cryptantha spp.	45	52	29	20	22	15	1.48	.42
F	Descurainia pinnata (a)	-	-	3	-	-	1	-	.00
F	Eriogonum ovalifolium	4	6	2	2	3	2	.01	.01
F	Gilia spp. (a)	-	3	-	-	1	-	.00	-
F	Lepidium spp. (a)	-	-	5	-	-	2	-	.06
F	Machaeranthera canescens	2	-	-	1	-	-	-	-

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Penstemon spp.	$_{b}$23	$_{a}$9	$_{a}$3	16	5	2	.02	.01
F	Phlox austromontana	4	-	-	1	-	-	-	-
F	Schoencrambe linifolia	-	-	2	-	-	1	-	.00
F	Stanleya spp.	3	-	-	1	-	-	-	-
F	Thelesperma subnudum	$_{b}$14	$_{a}$2	$_{a}$-	6	1	-	.00	-
F	Townsendia incana	3	3	-	1	1	-	.00	-
Total for Annual Forbs		0	3	8	0	1	3	0.00	0.06
Total for Perennial Forbs		107	80	36	53	36	20	1.55	0.44
Total for Forbs		107	83	44	53	37	23	1.55	0.50

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 28

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	0	0	-	-
B	Artemisia nova	69	74	7.10	8.23
B	Atriplex canescens	0	0	-	-
B	Cercocarpus montanus	26	25	7.46	7.96
B	Chrysothamnus nauseosus	2	0	-	-
B	Chrysothamnus viscidiflorus	0	1	-	-
B	Ephedra viridis	15	15	.78	.96
B	Eriogonum microthecum	21	15	.02	.01
B	Juniperus osteosperma	0	8	1.58	2.04
B	Opuntia spp.	4	4	.03	.18
B	Pinus edulis	0	13	4.87	5.03
Total for Browse		137	155	21.87	24.42

CANOPY COVER --
Herd unit 16C, Study no: 28

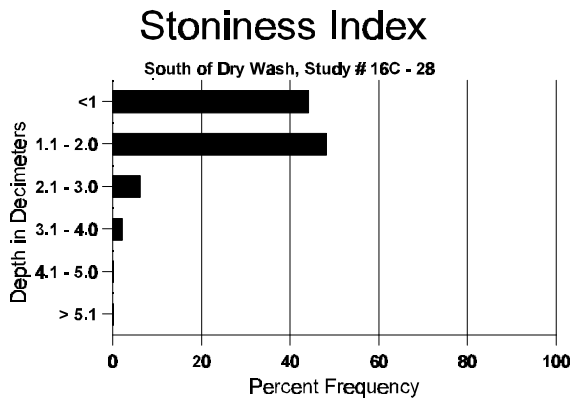
Species	Percent Cover '99
Cercocarpus montanus	3

BASIC COVER --
Herd unit 16C, Study no: 28

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	206	221	2.25	29.27	32.51
Rock	250	159	6.00	10.97	8.50
Pavement	248	251	16.25	4.17	12.60
Litter	373	364	52.00	39.35	48.24
Cryptogams	29	35	.25	.16	.75
Bare Ground	295	245	23.25	24.50	19.09

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 28, Study Name: South of Dry Wash

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.1	64.0 (11.7)	7.5	54.7	21.4	23.8	3.9	3.0	38.4	0.7



PELLET GROUP DATA --
Herd unit 16C, Study no: 28

Type	Quadrat Frequency '94	Quadrat Frequency '99
Rabbit	17	18
Elk	-	6
Deer	34	27

Pellet Transect Days Use/Acre (ha) '99
n/a
11 (27)
85 (210)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 28

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	7	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	0		-
	'94	0		-
	'99	0		-

Artemisia nova																		
S	88	7	-	-	-	-	-	-	-	-	7	-	-	-	233			7
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	23	1	-	1	-	-	-	-	-	25	-	-	-	833			25
	94	1	1	1	-	-	-	-	-	-	3	-	-	-	60			3
	99	12	1	-	1	1	-	1	-	-	16	-	-	-	320			16
M	88	24	11	-	-	-	-	2	-	-	36	-	1	-	1233	8	17	37
	94	54	41	25	6	5	-	-	-	-	118	-	-	-	2360	7	21	118
	99	93	35	3	5	-	-	5	-	-	141	-	-	-	2820	8	20	141
D	88	7	1	-	-	-	-	-	-	-	7	-	1	-	266			8
	94	6	30	9	3	3	-	-	-	-	40	-	-	11	1020			51
	99	20	4	-	4	3	-	2	-	-	16	-	2	15	660			33
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	19%	00%	03%	+37%
'94	43%	19%	06%	+ 3%
'99	23%	02%	09%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	2332		11%
	'94	3440		28%
	'99	3800		17%

Atriplex canescens																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	20	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	35	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	0		-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus montanus																		
S	88	14	-	-	1	-	-	20	-	-	35	-	-	-	1166			35
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
Y	88	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	5	-	1	-	-	-	-	-	-	6	-	-	-	120			6
	99	11	-	-	4	-	-	-	-	-	15	-	-	-	300			15
M	88	4	-	-	-	-	-	-	-	-	4	-	-	-	133	45	47	4
	94	3	13	3	-	1	-	-	-	-	20	-	-	-	400	52	64	20
	99	1	8	-	1	1	2	-	-	-	13	-	-	-	260	59	67	13
D	88	1	-	-	-	-	-	-	-	-	-	-	-	1	33			1
	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	1	-	-	1	-	-	-	-	2	-	-	-	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	14%	+57%
'94	56%	15%	00%	+10%
'99	37%	07%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	232	Dec:	14%
	'94	540		4%
	'99	600		7%

Chrysothamnus nauseosus

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	1	-	-	-	-	-	-	1	-	-	-	20	11	13	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	50%	50%	50%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	40		50%
	'99	0		0%

Chrysothamnus viscidiflorus

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	1	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	100%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ephedra viridis																		
S	88	2	-	-	-	-	-	1	-	-	3	-	-	-	100			3
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	1	1	-	-	-	-	-	2	-	-	-	40			2
M	88	10	1	-	1	-	1	-	-	-	12	-	1	-	433	27	22	13
	94	8	2	2	2	-	-	-	-	-	14	-	-	-	280	34	43	14
	99	3	7	-	1	1	-	-	-	-	12	-	-	-	240	39	46	12
D	88	6	-	1	-	-	-	-	-	-	7	-	-	-	233			7
	94	1	1	-	-	-	-	-	-	-	1	-	-	1	40			2
	99	-	1	1	1	-	-	-	-	-	3	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	04%	08%	04%	-59%
'94	18%	12%	06%	+ 0%
'99	53%	12%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	832	Dec:		28%
'94	340			12%
'99	340			18%

Eriogonum microthecum																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	99	8	-	-	-	1	-	1	-	-	10	-	-	-	200			10
M	88	20	-	-	1	-	-	3	-	-	24	-	-	-	800	2	2	24
	94	19	1	4	3	-	-	-	-	-	27	-	-	-	540	1	3	27
	99	9	4	2	1	-	-	-	-	-	16	-	-	-	320	2	4	16
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-40%
'94	03%	14%	03%	- 7%
'99	19%	07%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	966	Dec:		3%
'94	580			3%
'99	540			4%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
S	88	-	-	-	1	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	6	1	-	-	140			7
M	88	-	-	-	1	-	-	-	-	-	1	-	-	-	33	63	41	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	199	Dec:	-
	'94	0		-
	'99	160		-

Opuntia spp.																		
Y	88	3	-	-	-	-	-	1	-	-	4	-	-	-	133			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	6	-	-	-	-	-	1	-	-	7	-	-	-	233	2	5	7
	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	3	13	3
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	3	12	3
D	88	1	-	-	-	-	-	-	-	-	-	-	-	1	33			1
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	08%	-80%
'94	00%	00%	00%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	399	Dec:	8%
	'94	80		25%
	'99	80		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
S	88	3	-	-	1	-	-	1	-	-	5	-	-	-	166			5
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	10	-	-	-	-	-	-	-	-	10	-	-	-	333			10
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	88	1	-	-	1	-	-	-	-	-	1	-	1	-	66	44	52	2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	-	-	6
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	08%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	399	Dec:	-
	'94	0		-
	'99	260		-

Trend Study 16C-29-99

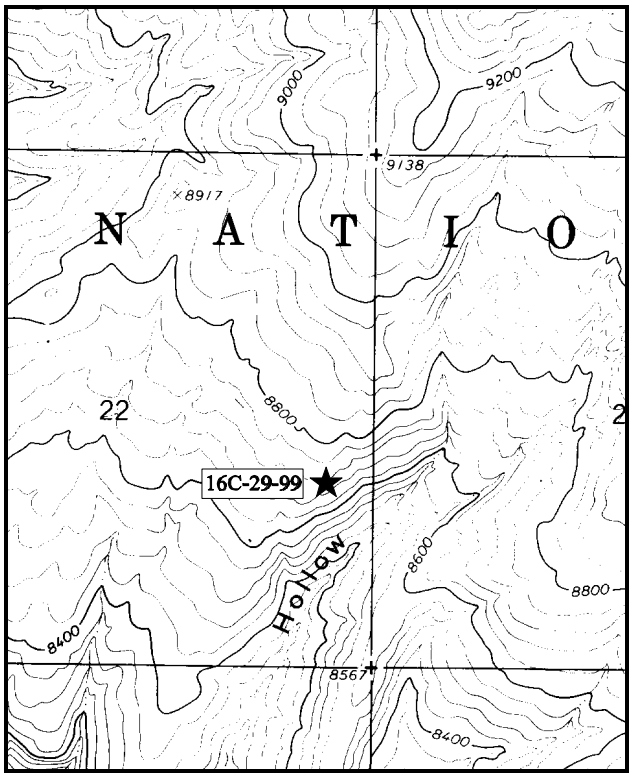
Study site name: Scab Hollow . Range type: Curlleaf Mountain Mahogany.

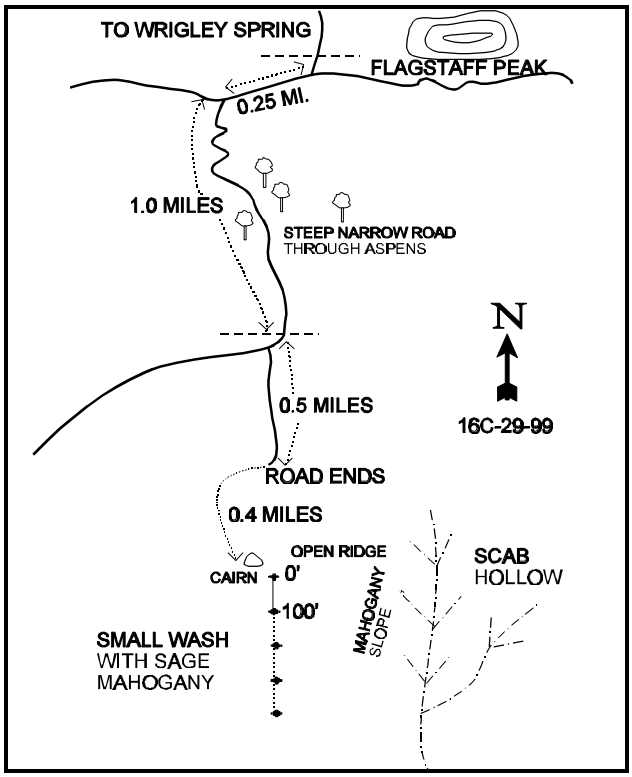
Compass bearing: frequency baseline 183°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Forest Service boundary up Ferron Canyon, travel 7.8 miles to Wrigley Reservoir. From Wrigley Springs Reservoir on F.S. Road #43, continue on the main road SW to Wrigley Spring. Proceed south 0.9 miles to a T-intersection. Turn right toward Twelve Mile Flat. Go 0.25 miles and turn left onto a dirt road (F.S. Road #274). Go 1.0 miles down through the aspens on the steep narrow road to a fence. Just past the fence, bear left at a faint fork. Continue 0.5 miles to the end of the road. It is possible to continue driving down the ridge. Turn right down the small hill then go down the ridge bearing left through the clearings for .4 miles to the SE edge of the small, open ridge above Scab Hollow. There is a rock cairn along the edge to mark the study site. From the cairn, it is 15 feet SE to the 0-foot baseline stake, identified by a red browse tag #9027 on the short fencepost. The study runs down across the slope.





Map Name: Flagstaff Peak Diagrammatic Sketch

Township 20S ,Range 5E , Section 22 UTM 4322386.215 N, 470769.185 E

DISCUSSION

Trend Study No. 16C-29 (31-27)

The Scab Hollow study is located in the upper end of Scab Hollow, a small drainage on the north side of Muddy Creek. The study samples a curlleaf mountain mahogany and grass slope. Further up the slope are some extremely large, old individuals of curlleaf mountain mahogany. The area is considered important elk winter range. Little elk sign was observed in 1994, but pellet group data from 1999 estimate 10 deer, 61 elk and 2 cow days use/acre (25 ddu/ha, 151 edu/ha, and 5 cdu/ha). Cattle graze this Forest Service land in summer as part of the Ferron allotment.

The soil is derived from a limestone parent material. It has a clay texture with a slightly alkaline pH (7.6). The soil is rocky and loose in the surface layer and easily disturbed. It is moderately deep with an effective rooting depth estimated at almost 16 inches. Phosphorus is limited at only 2.6 ppm. Values less than 10 ppm have been shown to limit normal plant growth and development. Rock in the profile consists mainly of gravel, although some large rocks are present in the profile and on the surface. Many of the rocks in the profile have a white coating of calcium carbonate. Open areas have high amounts of pavement cover. Erosion potential is high, yet current erosion is moderate. There is evidence of pedestaling and terracing on the steeper slopes. There are no active gullies on the site and grasses provide good overall soil protection.

The slope is dominated by a vigorous stand of curlleaf mountain mahogany that is light to moderately hedged. Some of the mature plants are large trees which are highlined and mostly unavailable to browsing. Average height of mature curlleaf was 6 ½ feet in 1994 and 7 feet in 1999. Overhead canopy cover was estimated at 14% in 1999. None of the plants sampled in 1994 or 1999 were decadent, but many plants contained numerous dead branches which is normal for curlleaf mountain mahogany. Young are common. Curlleaf mountain mahogany provided 42% of the browse cover in 1994 and 63% in 1999.

There are pockets of mountain big sagebrush and black sagebrush on the ridge which show light to moderate hedging. Other browse species which occur infrequently include rabbitbrush, buckwheat, broom snakeweed, Oregon grape, snowberry, and gray horsebrush. A few scattered pinyon and juniper trees occur on the site.

The herbaceous understory is abundant and provides the majority of the vegetation cover on the site. The dominant grass species is Salina wildrye which made up 93% of the herbaceous cover in 1994 and 72% by 1999. There is also some slender wheatgrass and Indian ricegrass present in small numbers. A variety of forbs are present on the site but all species combined made up less than one percent cover in 1994. Frequency and cover increased by 1999. However two species, bastard toadflax and gumweed aster, are the most common.

1994 TREND ASSESSMENT

Litter cover has decreased by 55% since 1988, while bare ground has increased by 23%. Most of the ground cover is provided by Salina wildrye, which is a slightly rhizomatous bunchgrass, and often leaves bare interspaces between individual plants. Trend for soil is slightly down. Curlleaf mountain mahogany is the key browse on this site. It is a vigorous stand with a small, but expanding, population. The increase in density of curlleaf mahogany and changes in density of other species are mostly due to the lengthening of the baseline in 1994 in order to sample a larger area. Browse trend is stable. Herbaceous understory trend is slightly down. Sum nested frequency of grasses have declined slightly while those of forbs decreased considerably since 1988.

TREND ASSESSMENT
soil - slightly down
browse - stable
herbaceous understory - slightly down, especially for forbs

1999 TREND ASSESSMENT

Trend for soil is slightly up. Percent cover of bare ground has declined from 31% to 22% while percent cover of litter has increased slightly. There is some erosion occurring and rock-pavement cover increased from 29% to 37% which would indicate some soil loss. Terracing and pedestaling are common on the steeper slopes. However, there are no active gullies on site and it appears that soil movement is localized. Trend for the key browse species, curlleaf mountain mahogany, is considered stable. The stand has a balanced population of young and mature plants which display moderate to heavy use. Vigor is normal and there were no decadent plants sampled. Trend for the herbaceous understory is stable for grasses and up slightly for forbs. Nested frequency of the dominant grass, Salina wildrye, has remained stable since 1988. Other grasses are infrequent. Sum of nested frequency of perennial forbs has increased and cover has gone up from 0.6% in 1994 to 5.5% in 1999. Sixty six percent of the forb cover comes from bastard toadflax. Overall herbaceous trend is considered up slightly.

TREND ASSESSMENT
soil - slightly up
browse - stable
herbaceous understory - stable for grasses and up for forbs, slightly up overall

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 29

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	-	-	2	-	-	2	-	.02
G	Agropyron trachycaulum	$_{b}$18	$_{a}$5	$_{ab}$21	11	3	7	.18	.65
G	Carex spp.	4	-	2	2	-	1	-	.03
G	Elymus salina	286	276	268	93	93	93	20.00	17.11
G	Oryzopsis hymenoides	27	33	19	11	16	10	.84	.37
G	Poa spp.	3	-	-	1	-	-	-	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		338	314	312	118	112	113	21.03	18.19
Total for Grasses		338	314	312	118	112	113	21.03	18.19
F	Astragalus convallarius	3	-	-	3	-	-	-	-
F	Castilleja linariaefolia	3	-	2	1	-	1	-	.03
F	Calochortus nuttallii	1	-	3	1	-	1	-	.00
F	Chaenactis douglasii	$_{a}$3	$_{a}$-	$_{b}$20	1	-	10	-	.25
F	Comandra pallida	$_{b}$61	$_{a}$25	$_{b}$82	23	13	29	.06	3.60
F	Cymopterus spp.	-	-	1	-	-	1	-	.00
F	Eriogonum alatum	$_{a}$-	$_{ab}$1	$_{b}$7	-	1	3	.00	.06

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Erigeron eatonii	-	-	2	-	-	1	-	.00
F	Erigeron spp.	2	-	3	1	-	1	-	.03
F	Hymenopappus filifolius	$_{b}$8	$_{ab}$5	$_{a}$-	3	2	-	.01	-
F	Hymenoxys richardsonii	12	2	3	6	1	3	.03	.18
F	Lappula occidentalis (a)	-	2	-	-	1	-	.00	-
F	Lesquerella spp.	$_{b}$28	$_{a}$4	$_{a}$8	12	2	5	.01	.10
F	Linum lewisii	-	4	3	-	2	3	.03	.04
F	Lithospermum ruderale	3	-	-	1	-	-	-	-
F	Machaeranthera canescens	9	-	3	4	-	1	-	.00
F	Machaeranthera grindelioides	$_{b}$51	$_{a}$21	$_{a}$20	21	11	9	.32	.67
F	Penstemon caespitosus	5	1	-	4	1	-	.00	-
F	Penstemon spp.	$_{ab}$1	$_{a}$-	$_{b}$8	1	-	3	-	.04
F	Petradoria pumila	8	4	9	3	2	3	.06	.33
F	Phlox hoodii	14	6	4	5	2	2	.03	.06
F	Senecio multilobatus	1	-	-	1	-	-	-	-
F	Tragopogon dubius	-	-	2	-	-	1	-	.03
Total for Annual Forbs		0	2	0	0	1	0	0.00	0
Total for Perennial Forbs		213	73	180	91	37	77	0.58	5.47
Total for Forbs		213	75	180	91	38	77	0.59	5.47

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 29

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Artemisia nova	3	3	.30	.18
B	Artemisia tridentata vaseyana	2	2	-	.00
B	Cercocarpus ledifolius	19	22	3.09	5.56
B	Chrysothamnus viscidiflorus	1	2	-	.06
B	Eriogonum corymbosum	18	9	.52	.48
B	Gutierrezia sarothrae	13	20	.05	.44
B	Juniperus scopulorum	0	1	2.25	2.00
B	Mahonia repens	10	11	.04	.06
B	Pinus edulis	0	1	-	-
B	Pinus flexilis	-	-	.98	-
B	Symphoricarpos oreophilus	2	1	-	-
B	Tetradymia canescens	2	2	.15	.03
Total for Browse		70	74	7.40	8.84

CANOPY COVER --
Herd unit 16C, Study no: 29

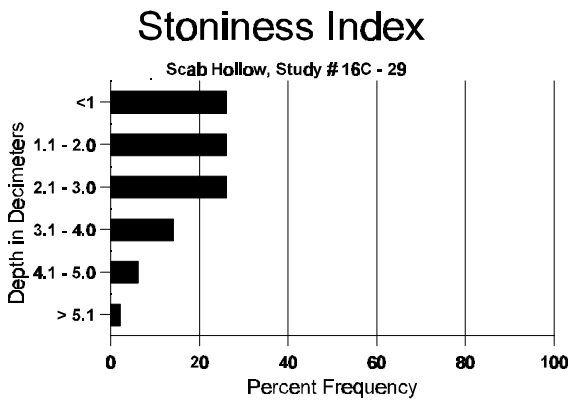
Species	Percent Cover '99
Cercocarpus ledifolius	14
Juniperus scopulorum	3

BASIC COVER --
Herd unit 16C, Study no: 29

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	297	303	5.50	29.47	30.78
Rock	331	261	6.50	19.67	16.20
Pavement	307	320	13.25	9.30	20.36
Litter	351	351	51.00	22.71	28.31
Cryptogams	3	7	0	.00	.04
Bare Ground	312	311	23.75	30.78	21.73

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 29, Study Name: Scab Hollow

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.7	53.6 (16.7)	7.6	34.0	24.2	41.8	2.9	2.3	89.6	0.6



PELLET GROUP DATA --
Herd unit 16C, Study no: 29

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	27	15	n/a
Elk	11	29	61 (151)
Deer	7	6	10 (25)
Cattle	1	-	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 29

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	5	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	1	-	-	-	-	-	-	-	3	-	-	-	60	10	22	3
	99	-	3	3	-	-	-	-	-	-	6	-	-	-	120	8	19	6
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	60%	00%	10%	-30%
'99	57%	43%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	200		10%
	'99	140		14%

Artemisia tridentata vaseyana																		
M	88	2	-	-	-	-	-	-	-	-	2	-	-	-	66	12	15	2
	94	1	1	-	-	-	-	-	-	-	2	-	-	-	40	6	10	2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	15	17	1
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-39%
'94	50%	00%	00%	+ 0%
'99	00%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	0%
	'94	40		0%
	'99	40		50%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus ledifolius																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	88	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	14	1	-	-	-	-	-	-	-	15	-	-	-	300			15
	99	15	1	-	-	1	-	-	-	-	17	-	-	-	340			17
M	88	-	1	-	-	-	-	-	1	-	2	-	-	-	66	119	116	2
	94	9	4	-	-	-	-	-	1	-	14	-	-	-	280	77	67	14
	99	4	5	3	-	1	1	1	1	-	16	-	-	-	320	84	78	16
D	88	-	-	-	-	-	-	1	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	20%	00%	00%	+72%
'94	17%	00%	00%	+12%
'99	24%	12%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	165	Dec:	20%
	'94	580		0%
	'99	660		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20	7	11	1
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20	7	9	1
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	100%	00%	00%	+50%
'99	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	20		0%
	'99	40		50%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum corymbosum																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	17	1	-	-	-	-	-	-	-	18	-	-	-	360			18
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	15	5	4	-	-	-	2	-	-	26	-	-	-	520	10	13	26
	99	13	6	-	-	-	-	-	-	-	19	-	-	-	380	7	9	19
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	2	-	-	-	-	-	-	-	-	-	-	2	40			2
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+93%
'94	17%	09%	04%	-54%
'99	29%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	50%
	'94	920		4%
	'99	420		10%

Gutierrezia sarothrae																		
Y	88	2	-	-	2	-	-	-	-	-	4	-	-	-	133			4
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	99	9	-	-	1	-	-	-	-	-	10	-	-	-	200			10
M	88	40	-	-	1	-	-	-	-	-	41	-	-	-	1366	8	10	41
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200	11	11	10
	99	75	-	-	-	-	-	-	-	-	75	-	-	-	1500	6	8	75
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-75%
'94	00%	00%	05%	+78%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1499	Dec:	0%
	'94	380		5%
	'99	1720		1%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus scopulorum																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	33	Dec:	-
	'94	0		-
	'99	20		-

Mahonia repens																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	19	-	-	4	-	-	3	-	-	26	-	-	-	866			26
	94	19	-	-	-	-	-	-	-	-	19	-	-	-	380			19
	99	26	-	-	-	-	-	-	-	-	26	-	-	-	520			26
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	8	-	-	2	-	-	-	-	-	10	-	-	-	200	3	4	10
	99	17	-	-	2	-	-	-	-	-	19	-	-	-	380	2	4	19
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-35%
'94	00%	00%	00%	+36%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	899	Dec:	4%
	'94	580		0%
	'99	900		0%

Pinus edulis																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
Y	88	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	2	-	-	-	-	-	-	2	-	-	-	40	7	13	2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	11	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	33%	00%	+45%
'99	00%	00%	00%	-67%

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'94	120		-
	'99	40		-

Tetradymia canescens																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	33	8	11	1
	94	3	1	-	-	-	-	-	-	-	4	-	-	-	80	7	13	4
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	18	1
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	25%	00%	00%	+18%
'99	50%	00%	00%	-50%

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	0%
	'94	80		0%
	'99	40		50%

Trend Study 16C-30-99

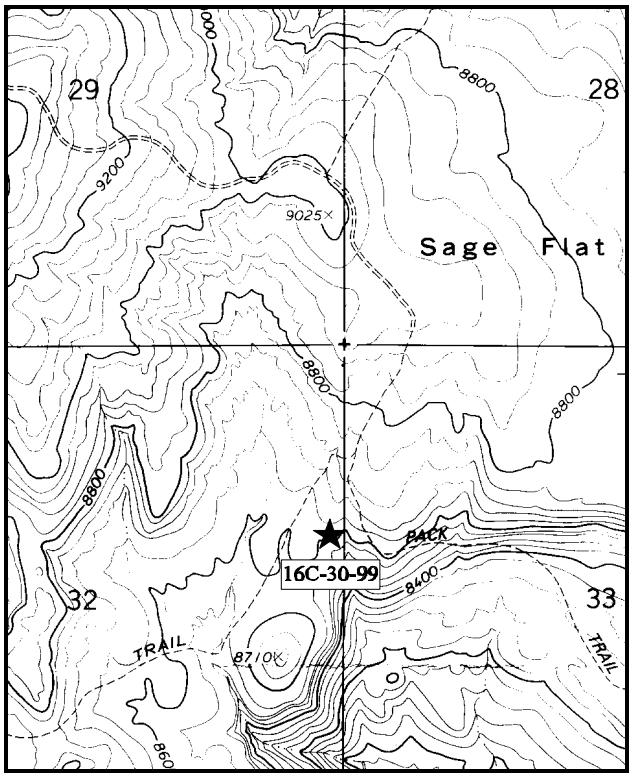
Study site name: Upper Hole Trail . Range type: Mixed Mountain Brush .

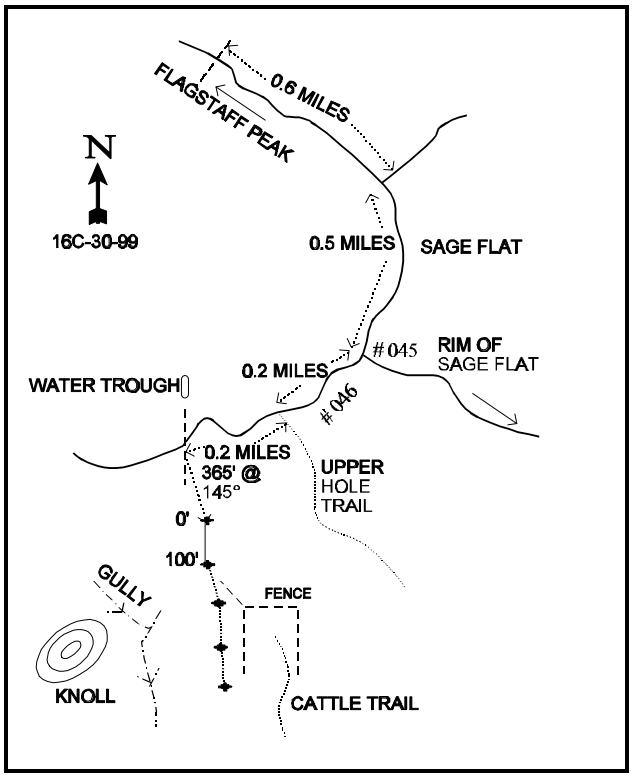
Compass bearing: frequency baseline 181°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Wrigley Springs Reservoir, continue SE 3.0 miles to the T-intersection by Flagstaff Peak. Turn left towards Sage Flat. Go 1.65 miles and cross a cattleguard. Continue straight 0.9 miles to a fence and cattleguard by a pond. Continue SE 1.0 miles to the Sage Flat seeding. Go 0.6 miles to a fork. Continue straight on the main road about 0.5 miles to a fork. At this point, a road that runs along the rim of Sage Flat takes off to the left (#045). Turn right at 0.35 miles on F.S. Road #046. Continue south 0.2 miles to the Hole Trail. Go another 0.2 miles on the main road to an old fence line by an unused water trough. The study starts about 100 yards south of the road. The first baseline stake, a 2' green fencepost with browse tag #9020 attached, is along an old fence line.





Map Name: Flagstaff Peak , Diagrammatic Sketch

Township 20S , Range 6E , Section 32 UTM 4320734.339 N, 477350.307 E

DISCUSSION

Trend Study No. 16C-30 (31-28)

The Upper Hole Trail trend study is located near Sage Flat. The area around Sage Flat and South Sage Flat on the southeast side of Ferron Mountain is listed as important elk winter range although there was little elk sign encountered in 1994, but sign increased substantially in 1999. It is an open sagebrush community with scattered mountain brush, mostly on the slopes. The study itself is located in a low saddle between the large sagebrush flats, in a mixed mountain brush type near the edge of the cliffs where the Upper Hole Trail climbs up from the pinyon-juniper country below. At the study site, slope is 12% with a southern exposure. The elevation is 8,600 feet. This Forest Service land is in the Ferron allotment and is grazed by cattle in the summer from June 21 to October 5. Pellet group data from 1999 estimate 5 deer, 32 elk and 31 cow days use/acre (12 ddu/ha, 79 edu/ha, and 77 cdu/ha). Rabbit pellet groups are very numerous. Most of the elk pellet groups are from last winter, but some are from this spring (‘99). About 40% of the cattle pats are from this season, while the rest are from last season. Cattle were in the area during the 1999 reading.

The soil has a clay loam texture with a neutral pH (7.3). The soil depth is moderately deep with an effective rooting depth estimated at almost 16 inches. Phosphorus and potassium are limited at just 2.6 ppm and 54.4 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium have been shown to limit normal plant growth and development. There is some rock on the surface and within the profile and there is a compacted layer at about 10 to 12 inches in depth. Although there is substantial soil movement and gullying on surrounding areas, especially on cattle and game trails, vegetative cover is generally adequate to prevent serious erosion on the study site.

The mountain brush slope is extremely diverse with 17 browse species encountered. The dominant species on the site include Utah serviceberry, antelope bitterbrush, mountain big sagebrush, and curlleaf mountain mahogany. Wood’s rose and snowberry are also common. Serviceberry had a population density of 4,799 plants/acre in 1988. Nearly all (98.6%) of these shrubs were classified as young plants. Seedlings were also abundant. This artificially inflated population returned to a more sustainable level by 1994 when 1,180 mostly mature plants were estimated. Mature plants averaged two and one-half feet in height with a crown diameter of almost three feet. Utilization was mostly light with a few individuals displaying moderate to heavy use. By 1999, the population has declined to 680 plants/acre. Use is mostly moderate to heavy, vigor normal, and percent decadence low at only 12%. Some of the differences in density between years may be partly due to the larger sample used in 1994 and 1999, and counting stems instead of whole plants.

Antelope bitterbrush had a density of 2,720 mostly mature plants/acre in 1994. Utilization is light to moderate, vigor is good and there were few decadent individuals. The mature shrubs averaged about 1 foot in height with a three foot crown. There were few young and no seedlings reported in 1988 or 1994. In 1999, density was estimated at 1,980 plants/acre, 75% of which are represented by low, prostrate mature plants. Utilization is moderate to heavy with nearly half of the population showing heavy use with a clubbed growth form. Young plants are common, vigor is good and decadent plants are rare. Some of the difference in density between 1994 estimates and 1999 counts may be caused by the difficulty in counting this large, prostrate shrub. In some instances, it is hard to tell where one plant stops and another starts.

Mountain big sagebrush appears to have a stable population of about 2,200 plants/acre that are mostly lightly hedged. Recruitment is adequate and percent decadency is fairly low at 23% in 1994 and only 10% in 1999. Black sagebrush has increased in density from 300 plants/acre in 1994 to 1,280 by 1999. This site appears to be a marginal one for mountain big sagebrush. Poor vigor was common in 1988 for both species and several mountain big sagebrush plants sampled in 1999 were chlorotic. Recall the very low amounts of phosphorus in the soil. The compaction layer found in the soil profile at 10 to 12 inches in depth may be a partial rooting barrier for mountain big sagebrush.

Curlleaf mountain mahogany made up 25% of the shrub cover in 1994 and 28% in 1999. There is currently an estimated 800 plants/acre with a good mix of tall partly available mature plants and shorter all available mature and young plants. Utilization has been light in the past, but current use is moderate to heavy. There is also a small population of heavily hedged true mountain mahogany. This along with rabbitbrush, Wood's rose, and snowberry provide some additional browse forage. A few scattered pinyon and limber pine are also found on the site.

Diversity is also high in the herbaceous component of the community. Eleven species of grass were identified in 1994 and 1999. Although combined all together they only provided 8% cover in 1994 and 7% in 1999. Of those, Salina wildrye is the most abundant. It accounted for 61% of the grass cover in 1994 and 43% in 1999. Diversity of forbs is excellent with 31 different species found in 1994 and 28 in 1999. Many are valuable forage species. Indian paintbrush, penstemon, redroot and sulfur eriogonum, and Oregon fleabane are most often utilized. Two low value forbs, rock goldenrod and desert phlox, provide nearly half of the forb cover.

1994 TREND ASSESSMENT

Bare ground and litter cover have both decreased. At this time vegetative cover offers as much protection to the soil as does the litter. Most of the vegetative cover (58%) comes from browse, but there is also an abundant herbaceous component which has increased in nested frequency since 1988. Soil trend is slightly up. Most preferred browse species appear to have stable mature populations, although mountain big sagebrush and black sagebrush have increased decadency rates. Several additional species were picked up in the shrub density strips due to the lengthening of the baseline in 1994. This new larger sample gives a better, more representative sample of the area. The browse trend is stable. Grasses are shifting toward more native and palatable species for both livestock and big game. Sum nested frequency of grasses increased slightly since 1988. There was a large increase in summed nested frequency for forbs, most of which offer moderate ground cover. The herbaceous understory trend is slightly up.

TREND ASSESSMENT
soil - slightly up
browse - stable
herbaceous understory - slightly up

1999 TREND ASSESSMENT

Trend for soil is up slightly. Percent cover of bare ground has declined and litter cover has increased. Vegetation cover has also increased but the improvement comes entirely from shrub cover which is less effective at protecting the soil. Rock and pavement cover have doubled since 1994 which may indicate some soil loss. Trend for the key browse species, serviceberry, mountain big sagebrush and curlleaf mountain mahogany, are considered stable. Utilization is moderate to heavy on serviceberry and curlleaf, but vigor remains good and percent decadence low. Mountain big sagebrush shows mostly light use. Vigor has improved and percent decadence has declined from 23% to 10%. Trend for the herbaceous is stable. Sum of nested frequency for perennial grasses and forbs have declined slightly but the dominant species, Salina wildrye, rock goldenrod, and desert phlox which provide 53% of the herbaceous cover, have remained stable.

TREND ASSESSMENT
soil - up slightly
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 30

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron cristatum	-	1	4	-	1	2	.03	.03
G	Agropyron trachycaulum	32	52	41	14	19	19	1.06	.26
G	Aristida purpurea	-	-	1	-	-	1	-	.00
G	Bouteloua gracilis	-	1	-	-	1	-	.00	-
G	Carex spp.	a6	b35	a16	2	14	7	.41	.37
G	Elymus salina	b251	a173	a169	87	69	68	5.05	4.10
G	Koeleria cristata	10	5	1	3	2	1	.06	.00
G	Oryzopsis hymenoides	10	12	10	4	5	4	.10	.09
G	Poa fendleriana	a63	b85	ab76	29	37	30	1.14	1.08
G	Sitanion hystrix	1	7	3	1	3	1	.04	.00
G	Stipa comata	7	8	2	5	3	1	.04	.00
G	Stipa lettermani	a-	b31	c66	-	12	23	.57	1.25
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		380	410	389	145	166	157	8.53	7.24
Total for Grasses		380	410	389	145	166	157	8.53	7.24
F	Antennaria microphylla	-	-	3	-	-	2	-	.03
F	Arenaria fendleri	a-	ab5	b9	-	2	4	.03	.24
F	Astragalus convallarius	2	13	1	1	5	1	.11	.01
F	Astragalus coltoni	a-	b24	a-	-	11	-	.37	-
F	Astragalus miser	a-	b7	a-	-	5	-	.15	-
F	Aster spp.	-	-	4	-	-	2	-	.01
F	Astragalus spp.	a10	ab19	b33	5	8	17	.16	.99
F	Caulanthus crassicaulis	3	-	-	2	-	-	-	-
F	Castilleja linariaefolia	b62	ab29	a28	29	14	15	.19	.22
F	Calochortus nuttallii	-	3	-	-	1	-	.00	-
F	Chaenactis douglasii	b23	a1	ab19	12	1	8	.00	.06
F	Cirsium spp.	1	6	8	1	4	4	.04	.10
F	Crepis acuminata	13	6	4	7	3	3	.01	.01
F	Cryptantha spp.	1	-	-	1	-	-	-	-
F	Cymopterus spp.	2	2	-	1	2	-	.01	-
F	Erigeron eatonii	40	48	35	21	22	17	.33	.18
F	Erigeron flagellaris	-	-	3	-	-	1	-	.00
F	Erigeron spp.	a-	a-	b9	-	-	4	-	.04
F	Erigeron pumilus	8	8	4	3	4	1	.02	.15
F	Eriogonum racemosum	-	42	36	-	19	17	.27	.26
F	Erigeron speciosus	b16	c29	a-	6	12	-	.33	-
F	Eriogonum umbellatum	a-	b9	b14	-	5	6	.22	.30
F	Hymenopappus filifolius	b10	a-	a2	7	-	1	-	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	‰94	‰99
F	Hymenoxys richardsonii	28	25	17	15	12	9	.08	.14
F	Lesquerella spp.	7	18	20	6	10	9	.05	.09
F	Lithospermum incisum	-	5	-	-	2	-	.01	-
F	Linum lewisii	-	2	-	-	2	-	.01	-
F	Lupinus spp.	2	10	8	2	5	4	.08	.16
F	Machaeranthera canescens	$_{b}$46	$_{ab}$18	$_{a}$11	20	11	5	.10	.10
F	Machaeranthera grindelioides	$_{b}$37	$_{a}$11	$_{a}$8	16	6	4	.08	.07
F	Oxytropis lambertii	$_{b}$22	$_{a}$1	$_{a}$-	11	1	-	.00	-
F	Penstemon carnosus	34	39	33	18	16	18	.18	.68
F	Penstemon spp.	33	39	35	14	20	16	1.21	.81
F	Petradoria pumila	$_{a}$19	$_{b}$63	$_{b}$56	11	24	24	2.26	2.49
F	Phlox austromontana	$_{a}$-	$_{b}$71	$_{b}$71	-	26	27	1.92	2.25
F	Polygonum douglasii (a)	-	11	6	-	4	2	.02	.01
F	Senecio multilobatus	$_{a}$3	$_{ab}$5	$_{b}$14	1	3	8	.01	.07
F	Taraxacum officinale	4	-	3	2	-	2	-	.01
Total for Annual Forbs		0	11	6	0	4	2	0.01	0.00
Total for Perennial Forbs		426	558	488	212	256	229	8.32	9.57
Total for Forbs		426	569	494	212	260	231	8.35	9.59

Values with different subscript letters are significantly different at ‰ = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 30

Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Amelanchier utahensis	29	23	3.10	2.87
B	Artemisia nova	7	21	.42	.91
B	Artemisia tridentata vaseyana	66	50	2.99	5.00
B	Cercocarpus ledifolius	24	26	5.79	7.88
B	Cercocarpus montanus	5	5	.00	.21
B	Chrysothamnus depressus	19	17	.28	.37
B	Chrysothamnus viscidiflorus	21	19	.69	.45
B	Eriogonum corymbosum	3	2	.15	.03
B	Gutierrezia sarothrae	14	12	.21	.10
B	Juniperus osteosperma	-	-	.15	-
B	Leptodactylon pungens	8	8	.15	.36
B	Pinus edulis	0	1	.15	-
B	Purshia tridentata	33	37	4.69	4.87
B	Rosa woodsii	13	13	.82	.96
B	Symphoricarpos oreophilus	36	41	3.26	4.06
B	Tetradymia canescens	1	1	.03	-
B	Yucca baileyi navajoa	7	7	.09	.16
Total for Browse		286	283	23.03	28.29

CANOPY COVER --
Herd unit 16C, Study no: 30

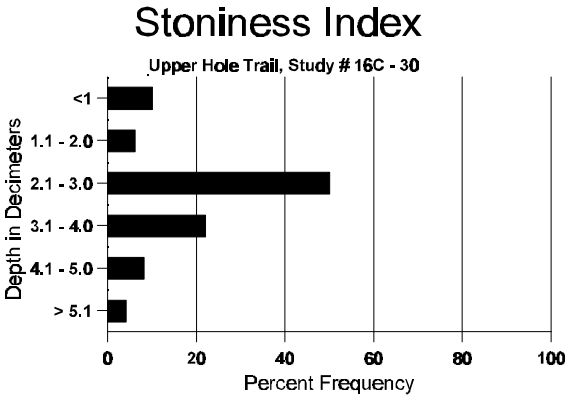
Species	Percent Cover '99
Amelanchier utahensis	3
Cercocarpus ledifolius	11
Pinus edulis	2

BASIC COVER --
Herd unit 16C, Study no: 30

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	316	315	13.25	38.02	42.09
Rock	128	109	.50	3.47	5.51
Pavement	94	135	0	.59	2.87
Litter	380	383	55.50	38.12	52.62
Cryptogams	1	3	.25	.03	.03
Bare Ground	281	244	30.50	26.51	21.57

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 30, Study Name: Upper Hole Trail

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.1	54.0 (14.4)	7.3	44.0	22.2	33.8	2.6	2.6	54.4	0.6



PELLET GROUP DATA --
Herd unit 16C, Study no: 30

Type	Quadrat Frequency '94	Quadrat Frequency '99
Rabbit	15	48
Elk	3	14
Deer	3	3
Cattle	5	8

Pellet Transect Days Use/Acre (ha) '99
n/a
32 (79)
5 (12)
31 (77)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 30

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	88	19	1	-	-	-	-	-	-	-	20	-	-	-	1333			20
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	3	-	-	-	-	-	6	-	-	-	120			6
Y	88	67	4	-	-	-	-	-	-	-	71	-	-	-	4733			71
	94	8	-	-	4	-	-	1	-	-	13	-	-	-	260			13
	99	4	5	3	2	-	1	-	-	-	15	-	-	-	300			15
M	88	-	1	-	-	-	-	-	-	-	1	-	-	-	66	27	12	1
	94	36	4	1	4	-	-	-	-	-	45	-	-	-	900	29	31	45
	99	-	9	1	1	1	1	2	-	-	15	-	-	-	300	80	81	15
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	2	2	-	-	-	-	-	-	2	-	-	2	80			4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	07%	00%	00%	-75%
'94	08%	02%	00%	-42%
'99	50%	24%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	4799	Dec:	0%
	'94	1180		2%
	'99	680		12%

Artemisia nova																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	6	-	1	-	140			7
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	88	2	-	-	-	-	-	-	-	-	1	-	1	-	133	7	8	2
	94	9	-	-	-	-	-	-	-	-	9	-	-	-	180	11	19	9
	99	26	14	1	-	-	-	-	-	-	38	-	3	-	820	8	15	41
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	6	-	-	-	-	-	-	-	-	1	-	-	5	120			6
	99	9	-	-	-	-	-	-	-	-	5	-	-	4	180			9
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	25%	+12%
'94	00%	00%	33%	+77%
'99	22%	02%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	265	Dec:	25%
	'94	300		40%
	'99	1280		14%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	88	11	-	-	-	-	-	1	-	-	12	-	-	-	800			12
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	47	1	-	-	-	-	1	-	-	48	1	-	-	980			49
Y	88	12	-	-	1	-	-	-	-	-	12	-	1	-	866			13
	94	16	1	-	4	-	-	-	-	-	21	-	-	-	420			21
	99	30	3	-	-	-	-	-	-	-	32	-	1	-	660			33
M	88	10	3	1	-	-	-	-	-	-	6	-	8	-	933	20	21	14
	94	62	5	-	2	-	-	3	-	-	72	-	-	-	1440	17	21	72
	99	57	7	-	2	-	-	-	-	-	64	-	2	-	1320	19	27	66
D	88	4	-	-	-	-	-	1	-	-	2	-	3	-	333			5
	94	25	2	-	1	-	-	-	-	-	11	-	-	17	560			28
	99	11	-	-	-	-	-	-	-	-	8	-	2	1	220			11
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	240			12

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	09%	03%	38%	+12%
'94	07%	00%	14%	- 9%
'99	09%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	2132	Dec:	16%
	'94	2420		23%
	'99	2200		10%

Cercocarpus ledifolius																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	2	-	-	-	-	-	4	-	-	-	80			4
	99	-	3	1	1	-	-	-	-	-	5	-	-	-	100			5
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	29	1	2	-	-	-	-	-	-	32	-	-	-	640	46	47	32
	99	14	7	2	-	1	7	1	-	-	32	-	-	-	640	68	57	32
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	2	1	-	-	-	-	-	-	3	-	-	-	60			3
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	03%	06%	00%	+10%
'99	33%	28%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	720		0%
	'99	800		8%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus montanus																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	3	-	-	3	-	-	-	60			3
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	8	-	-	-	-	1	-	-	9	-	-	-	180	25	37	9
	99	2	-	6	-	-	2	-	-	-	10	-	-	-	200	20	24	10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	67%	00%	00%	- 8%
'99	09%	73%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	240		-
	'99	220		-

Chrysothamnus depressus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	36	9	-	-	-	-	1	-	-	46	-	-	-	920	6	7	46
	99	8	10	2	-	-	1	-	-	-	21	-	-	-	420	3	12	21
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	4	-	-	-	-	-	-	-	-	3	-	-	1	80			4
	99	-	5	3	-	-	-	-	-	-	7	-	-	1	160			8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	18%	00%	02%	-34%
'99	45%	18%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	1000		8%
	'99	660		24%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
Y	88	3	1	1	-	-	-	-	-	-	4	-	1	-	333			5
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	3	-	-	-	-	-	7	-	-	2	-	8	-	666	2	4	10
	94	23	2	-	10	-	-	-	-	-	35	-	-	-	700	6	10	35
	99	6	13	1	2	-	-	-	-	-	19	-	3	-	440	12	13	22
D	88	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	94	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	99	1	2	1	-	-	-	-	-	1	3	-	-	2	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	06%	06%	56%	-27%
'94	05%	00%	00%	-28%
'99	54%	11%	18%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	1065	Dec:	6%
	'94	780		5%
	'99	560		18%

Eriogonum corymbosum																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	2	1	-	4	-	-	-	-	-	7	-	-	-	140	9	15	7
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	18	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	14%	00%	00%	-71%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	140		-
	'99	40		-

Gutierrezia sarothrae																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	2	1
	94	20	-	-	2	-	-	-	-	-	22	-	-	-	440	6	6	22
	99	27	-	-	-	-	-	-	-	-	27	-	-	-	540	6	6	27

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+86%
'94	00%	00%	00%	+29%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'94	480		-
	'99	680		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Leptodactylon pungens																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	29	-	-	-	-	-	-	-	-	29	-	-	-	580	13	8	29
	99	36	-	-	-	-	-	-	-	-	36	-	-	-	720	6	7	36
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+25%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'94	600		0%
	'99	800		5%

Pinus edulis																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	88	8	1	-	-	-	-	-	-	-	9	-	-	-	600			9
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	99	2	12	6	1	-	-	1	-	-	22	-	-	-	440			22
M	88	-	6	-	1	-	-	-	-	-	7	-	-	-	466	12	39	7
	94	101	23	1	2	-	-	-	-	-	123	4	-	-	2540	11	36	127
	99	1	22	19	-	10	22	-	-	-	74	-	-	-	1480	16	38	74
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	2	-	-	1	-	-	-	-	-	1	-	-	2	60			3
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	41%	00%	00%	+58%
'94	18%	.73%	00%	-27%
'99	44%	47%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1132	Dec:		6%
'94	2720			1%
'99	1980			3%

Rosa woodsii																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	37	-	-	2	-	-	-	-	-	39	-	-	-	780			39
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	23	-	-	4	-	-	-	-	-	27	-	-	-	540			27
	99	52	-	-	11	-	-	4	-	-	67	-	-	-	1340			67
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	62	-	-	64	-	-	-	-	-	126	-	-	-	2520	8	5	126
	99	21	-	-	12	-	-	4	-	-	37	-	-	-	740	17	10	37

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	-32%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	3060			-
'99	2080			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	88	11	-	-	-	-	-	-	-	-	11	-	-	-	733			11
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	3	-	-	7	-	-	-	140			7
Y	88	22	-	-	-	-	-	-	-	-	22	-	-	-	1466			22
	94	5	-	-	3	-	-	-	-	-	8	-	-	-	160			8
	99	10	3	-	11	-	-	2	-	-	26	-	-	-	520			26
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	64	43	1
	94	63	8	-	30	-	5	2	-	-	108	-	-	-	2160	12	24	108
	99	39	-	-	20	-	-	1	-	-	60	-	-	-	1200	17	27	60
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+35%
'94	08%	04%	00%	-26%
'99	05%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1532	Dec:		0%
'94	2360			2%
'99	1740			1%

Tetradymia canescens																		
Y	88	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200	5	6	3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	6	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-94%
'94	00%	00%	00%	-50%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	666	Dec:		-
'94	40			-
'99	20			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Yucca baileyi navajoa																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
	99	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	9	10	1
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100	8	10	5
	99	6	-	-	-	-	-	-	-	-	7	-	-	-	140	6	12	7
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+79%
'94	00%	00%	00%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	66		-
	'94	320		-
	'99	320		-

Trend Study 16C-31-99

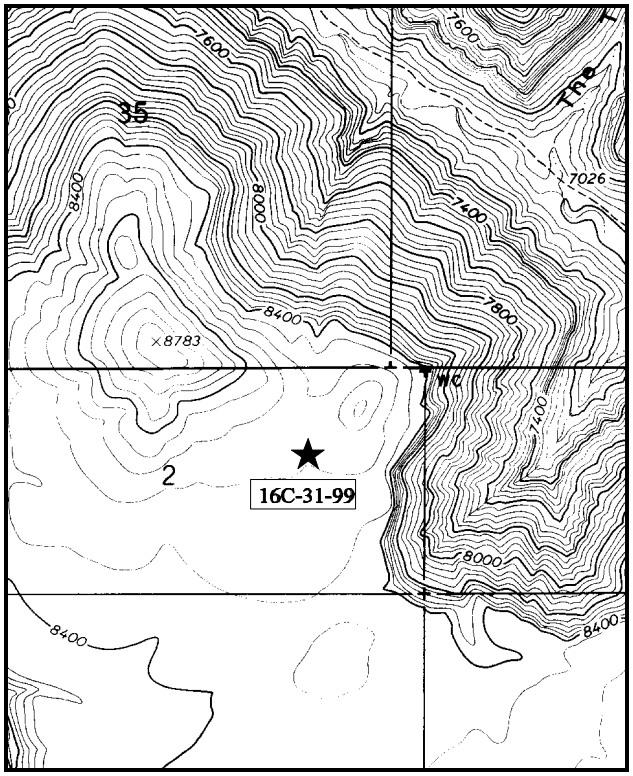
Study site name: Box Canyon Knolls . Range type: Black Sagebrush .

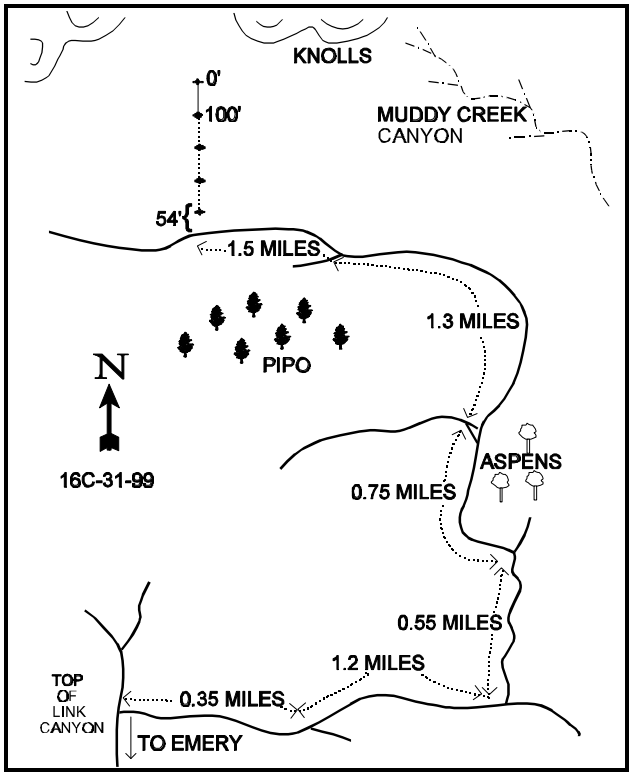
Compass bearing: frequency baseline 180°M.

Footmark (first frame placement) 5 feet, footmarks line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Center Street in the town of Emery, continue south on Highway 10 for 1.2 miles. Turn right onto a dirt road and go 0.6 miles. Turn left and travel up Link Canyon 7 miles (4WD road) to the top. Turn right at the fork and proceed 0.35 miles. Bear left and continue 1.2 miles. Turn left off the jeep trail and go 0.55 miles to a faint fork. Bear left onto F.S. Road #28 and go 0.75 miles to a junction. Bear right and continue northwest 1.3 miles to another fork. Stay right on F.S. #278. Travel 1.5 miles and stop just past a lone limber pine. In the sage flat on the right side of the road, the study is marked by short fenceposts. The 400-foot baseline stake is 54 feet north of the road. The 0-foot baseline stake is 400 feet further north, and is marked by browse tag #9028.





Map Name: Flagstaff Peak Diagrammatic Sketch

Township 21S , Range 5E , Section 2 UTM 4318109.110 N, 472087.366 E

DISCUSSION

Trend Study No. 16C-31 (31-29)

The Box Canyon Knolls are located on the south side of the steep Muddy Creek canyon. This remote area is used by elk in winter. The study site is located in the open black sagebrush/grass type that covers most the flats. Elevation is 8,500 feet. The slope on the flat is very gentle with a southern aspect. The area is managed by the Forest Service, usually as an early unit in the summer rest-rotation system on the Emery cattle allotment. Abundant elk sign was encountered in 1994 and 1999. Pellet group data from 1999 estimate 5 deer, 108 elk and 9 cow days use/acre (12 ddu/ha, 267 edu/ha, and 22 cdu/ha). Most of the elk pellet groups are from winter use but some are more recent. All of the cow pats appear to be from last season.

Soil on the site is moderately shallow with an effective rooting depth of almost 14 inches. Texture is a clay loam with a neutral pH (6.8). There is very little rock in the profile or on the surface. The soil is very dense with a compacted horizon which varies in depth from 8 to 12 inches. The 1% slope precludes most soil movement and erosion is minimal, although bare spots are frequent. Some soil pedestaling is evident around shrubs and grasses. The surface of the clay loam soil shows expansion/contraction cracking which would indicate the presence of shrink/swell clays. Soil parent material appears to be limestone.

The dominant key browse species, black sagebrush, has a low-growing dense population. The majority of the plants have been lightly hedged, although some display moderate use. The age class structure indicates a stable population with excellent young recruitment, good vigor, and low decadence. Even with the large numbers of young plants, the population will likely not increase much in the future due to the high density of shrubs on the site. A small population of stunted mountain big sagebrush also occurs on the site. These shrubs show heavier use.

Low rabbitbrush is extremely abundant on the site. These shrubs are small, measuring only 4 x 8 inches and have an estimated population density of 22,420 plants/acre in 1994 and 19,220 by 1999. They are lightly hedged, in good vigor, and have low decadence. Other species on the site include small numbers of Utah serviceberry, fringed sagebrush, dwarf rabbitbrush, rubber rabbitbrush, broom snakeweed, and gray horsebrush.

Grasses are abundant on the site with pinewoods needlegrass, the dominant species, providing 72% of the grass cover in 1994 and 41% in 1999. Sheep fescue and mutton bluegrass are also common. All grasses combined provided 14% cover in 1994 and 11% in 1999. Forbs are diverse but provided only 2% cover in 1994 and 3% in 1999. Forbs tend to be low growing species. Narrowleaf paintbrush and lupine are the only large species, with common paintbrush, penstemon, and redroot eriogonum provide palatable spring forage.

1994 TREND ASSESSMENT

Trend for soil is up due mostly to a decrease in bare ground from 54% to 40%. Litter cover has increased slightly and provides well dispersed protective cover. The key browse on this site is black sagebrush. The mature plants in the population have increased while the number of decadent plants have decreased. There are many young plants in the population but few seedlings. Trend for browse is slightly up. Sum of nested frequency of grasses have increased since 1988, while those of forbs declined. Sum of nested frequency for grasses and forbs combined have remained similar indicating a stable herbaceous understory trend.

TREND ASSESSMENT
soil - up
browse - slightly up
herbaceous understory - stable

1999 TREND ASSESSMENT

Trend for soil is stable. Percent cover of litter has declined but cover of bare ground has remained stable. There is some soil pedestaling apparent around plants but erosion is minimal due to the level terrain. Trend for browse is stable. Density of the key species, black sagebrush, has increased slightly and there are abundant seedlings and young. Utilization is heavier but vigor is normal on most plants. Percent decadency has increased slightly but it is still low at 14%. The small stand of stunted mountain big sagebrush has increased slightly in density. It displays moderate to heavy use, good vigor and increased decadence since 1994. Rabbitbrush is still the most abundant numerous shrub on the site. This increaser, has declined steadily in density since 1988 from 32,599 plants/acre to 19,220 by 1999. The population is mostly mature with a moderate amount of young plants sampled. Trend for the herbaceous understory is down slightly. Sum of nested frequency of perennial grasses and forbs have declined slightly. Both slender wheatgrass and pinewoods needlegrass have declined significantly in nested frequency.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - down slightly

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 31

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron trachycaulum	$_{b}$121	$_{b}$128	$_{a}$72	52	47	31	1.15	.84
G	Festuca ovina	$_{a}$26	$_{a}$15	$_{b}$110	12	6	45	.10	2.92
G	Poa fendleriana	$_{a}$130	$_{b}$157	$_{b}$140	59	63	51	2.85	2.59
G	Sitanion hystrix	$_{b}$27	$_{a}$1	$_{b}$19	13	1	9	.00	.13
G	Stipa pinetorum	$_{b}$236	$_{c}$281	$_{a}$208	90	97	77	10.37	4.43
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		540	582	549	226	214	213	14.49	10.93
Total for Grasses		540	582	549	226	214	213	14.49	10.93
F	Antennaria parvifolia	5	16	18	2	6	6	.65	.84
F	Androsace septentrionalis (a)	-	$_{a}$-	$_{b}$33	-	-	19	-	.15
F	Arabis spp.	$_{b}$18	$_{a}$-	$_{a}$3	13	-	1	-	.00
F	Artemisia frigida	-	2	-	-	1	-	.00	-
F	Astragalus agrestis	$_{a}$8	$_{ab}$16	$_{b}$19	3	7	10	.03	.17
F	Astragalus convallarius	-	3	2	-	2	1	.01	.00
F	Castilleja chromosa	$_{b}$43	$_{a}$-	$_{a}$-	22	-	-	-	-
F	Castilleja linariaefolia	3	3	7	1	1	5	.00	.10
F	Calochortus nuttallii	$_{b}$20	$_{a}$-	$_{b}$8	8	-	4	-	.02
F	Chaenactis douglasii	$_{b}$21	$_{a}$-	$_{a}$1	13	-	1	-	.00
F	Crepis acuminata	11	5	4	5	3	2	.01	.06
F	Cryptantha spp.	-	2	-	-	1	-	.00	-

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
F	Eriogonum alatum	$_{a}$-	$_{ab}$3	$_{b}$3	-	1	1	.00	.03
F	Erigeron eatonii	$_{c}$197	$_{b}$141	$_{a}$67	77	59	34	.54	.59
F	Erigeron pumilus	$_{a}$7	$_{b}$22	$_{a}$5	3	10	3	.21	.04
F	Eriogonum racemosum	72	64	70	31	30	32	.25	.92
F	Eriogonum umbellatum	24	33	16	11	16	8	.15	.09
F	Hymenoxys richardsonii	9	7	3	3	4	1	.02	.00
F	Lupinus argenteus	$_{ab}$3	$_{a}$-	$_{b}$9	2	-	5	-	.08
F	Machaeranthera canescens	$_{b}$9	$_{a}$-	$_{a}$-	4	-	-	-	-
F	Penstemon caespitosus	$_{c}$31	$_{b}$7	$_{a}$-	14	3	-	.04	-
F	Penstemon carnosus	$_{a}$-	$_{a}$1	$_{b}$10	-	1	5	.00	.05
F	Polygonum douglasii (a)	-	1	-	-	1	-	.00	-
F	Senecio multilobatus	$_{a}$-	$_{ab}$3	$_{b}$8	-	1	4	.00	.04
F	Sphaeralcea coccinea	-	-	2	-	-	1	-	.00
F	Townsendia incana	1	-	-	1	-	-	-	-
F	Tragopogon dubius	$_{ab}$2	$_{a}$-	$_{b}$6	2	-	3	-	.01
Total for Annual Forbs		0	1	33	0	1	19	0.00	0.15
Total for Perennial Forbs		484	328	261	215	146	127	1.96	3.09
Total for Forbs		484	329	294	215	147	146	1.97	3.24

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 31

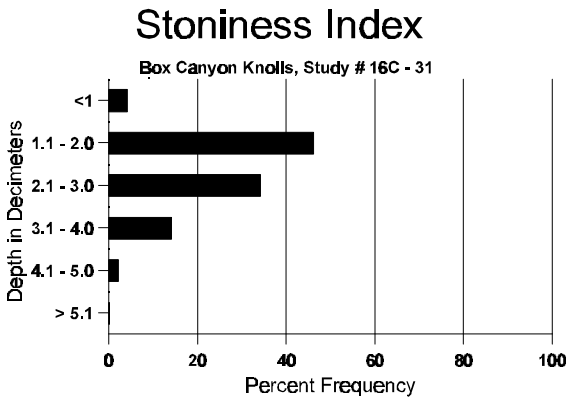
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	0	0	-	-
B	Artemisia frigida	3	4	.00	.01
B	Artemisia nova	97	94	5.50	9.05
B	Artemisia tridentata vaseyana	22	29	1.80	1.95
B	Ceratoides lanata	0	1	.03	.03
B	Chrysothamnus depressus	3	6	.18	.16
B	Chrysothamnus nauseosus	0	0	-	-
B	Chrysothamnus viscidiflorus	93	93	5.15	7.64
B	Gutierrezia sarothrae	8	8	.04	.09
B	Opuntia spp.	0	0	-	-
B	Tetradymia canescens	6	9	.18	.24
Total for Browse		232	244	12.90	19.17

BASIC COVER --
Herd unit 16C, Study no: 31

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	342	335	8.75	35.04	34.84
Rock	178	45	1.25	1.14	.76
Pavement	224	151	.25	.70	1.35
Litter	393	355	35.75	37.44	27.93
Cryptogams	49	71	.50	.23	.82
Bare Ground	370	326	53.50	40.24	39.54

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 31, Study Name: Box Canyon Knolls

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.8	55.6 (16.4)	6.8 4	42.0	25.4	32.6	2.9	13.2	137.6	0.4



PELLET GROUP DATA --
Herd unit 16C, Study no: 31

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	16	7	n/a
Elk	62	55	108 (267)
Deer	11	5	5 (12)
Cattle	1	7	9 (22)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 31

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	20	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	36	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	0			-

Artemisia frigida																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	2	5	4
	99	1	2	-	-	-	-	-	-	-	3	-	-	-	60	6	6	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	60%	00%	00%

%Change
+20%

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	-
'94	80		-
'99	100		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	88	25	-	-	-	-	-	67	-	-	92	-	-	-	6133			92
	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	99	57	-	-	-	-	-	-	-	-	57	-	-	-	1140			57
Y	88	49	6	-	-	1	-	-	-	-	50	-	6	-	3733			56
	94	184	6	-	-	-	-	-	-	-	190	-	-	-	3800			190
	99	182	12	5	-	-	-	-	-	-	199	-	-	-	3980			199
M	88	30	14	2	-	-	-	-	-	-	42	-	4	-	3066	8	13	46
	94	229	57	-	1	-	-	-	-	-	287	-	-	-	5740	6	13	287
	99	183	139	24	-	-	-	-	-	-	346	-	-	-	6920	7	15	346
D	88	46	6	1	-	-	-	-	-	-	49	-	3	1	3533			53
	94	27	8	-	1	-	-	-	-	-	6	-	-	30	720			36
	99	64	25	-	-	-	-	-	-	-	78	-	-	11	1780			89
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	480			24
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1220			61

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	17%	02%	09%	- 1%
'94	14%	00%	06%	+19%
'99	28%	05%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	10332	Dec:	34%
	'94	10260		7%
	'99	12680		14%

Artemisia tridentata vaseyana																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	3	-	-	-	-	-	-	3	-	-	-	60			3
Y	88	1	2	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	36	-	-	-	-	-	-	-	-	36	-	-	-	720	11	18	36
	99	16	11	9	-	-	-	-	-	-	36	-	-	-	720	15	24	36
D	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	2	7	3	1	-	-	-	-	-	11	-	1	1	260			13
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	40%	00%	00%	+59%
'94	00%	00%	02%	+23%
'99	34%	23%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	333	Dec:	40%
	'94	820		2%
	'99	1060		25%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceratoides lanata																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	6	6	15
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	7	0
	99	-	2	-	-	-	-	-	-	-	2	-	-	-	40	4	5	2
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	100%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)			
	'88	1266	Dec: 5%
	'94	0	0%
	'99	40	0%

Chrysothamnus depressus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4	9	5
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140	3	9	7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

+38%

Total Plants/Acre (excluding Dead & Seedlings)			
	'88	0	Dec: -
	'94	100	-
	'99	160	-

Chrysothamnus nauseosus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	24	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	24	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'94	00%	00%	00%
'99	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)			
	'88	0	Dec: -
	'94	0	-
	'99	0	-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
S	88	16	-	-	-	-	-	2	-	-	18	-	-	-	1200			18
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	88	99	1	-	-	-	-	9	-	-	108	-	1	-	7266			109
	94	404	-	-	-	-	-	-	-	-	404	-	-	-	8080			404
	99	144	2	-	-	-	-	-	-	-	146	-	-	-	2920			146
M	88	280	22	-	-	-	-	10	-	-	303	-	9	-	20800	3	6	312
	94	705	12	-	-	-	-	-	-	-	717	-	-	-	14340	3	7	717
	99	753	23	-	-	-	-	-	-	-	776	-	-	-	15520	4	8	776
D	88	55	11	-	-	-	-	2	-	-	58	-	9	1	4533			68
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	39	-	-	-	-	-	-	-	-	35	-	1	3	780			39
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	07%	00%	04%	-31%
'94	01%	00%	00%	-14%
'99	03%	00%	.41%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	32599	Dec:		14%
'94	22420			0%
'99	19220			4%

Gutierrezia sarothrae																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	200	3	6	10
	99	21	-	-	-	-	-	-	-	-	21	-	-	-	420	4	8	21
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	+52%
'99	00%	00%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		0%
'94	220			0%
'99	460			9%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133	2	6	2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	15	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	133	Dec:	-
	'94	0		-
	'99	0		-

Tetradymia canescens																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	6	1	-	-	-	-	-	-	-	7	-	-	-	140	6	8	7
	99	4	5	2	-	-	1	-	-	-	12	-	-	-	240	6	8	12

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	13%	00%	00%	+33%
'99	42%	25%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	160		-
	'99	240		-

Trend Study 16C-32-99

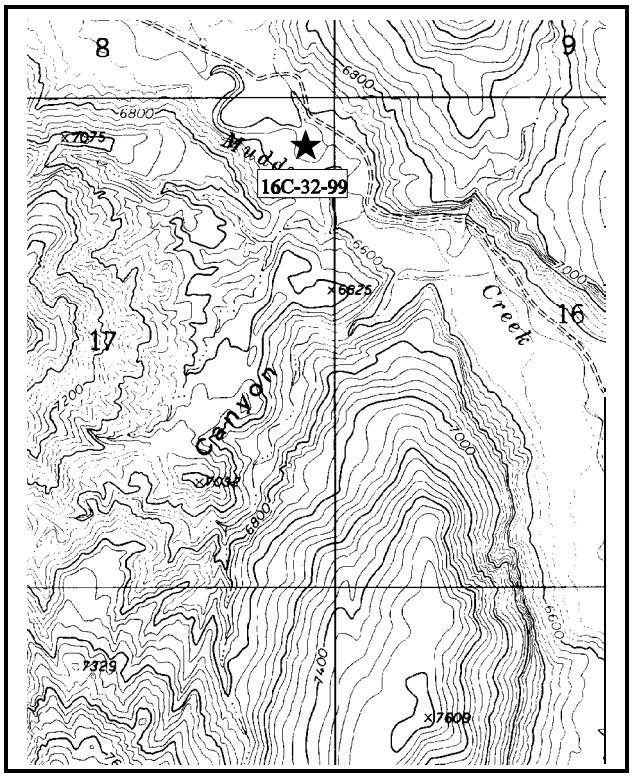
Study site name: Muddy Creek . Range type: Big Sagebrush - Grass .

Compass bearing: frequency baseline 162°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

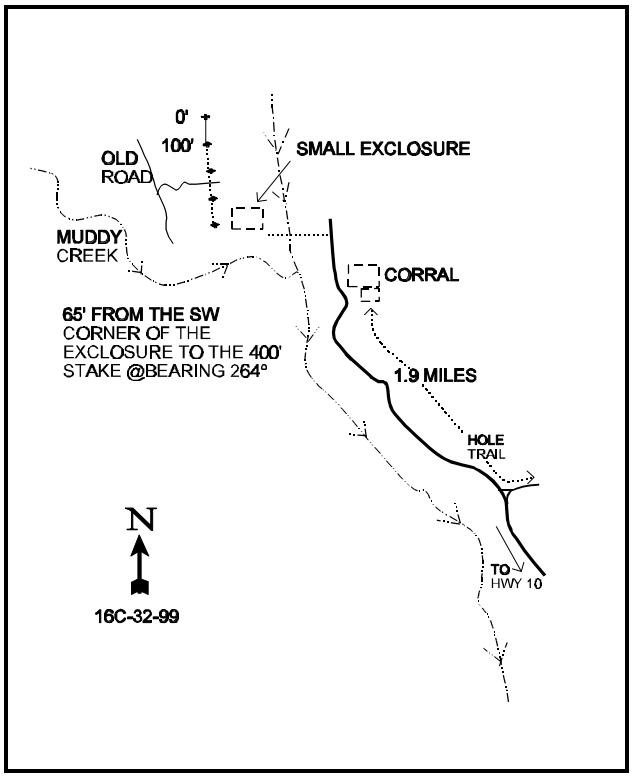
LOCATION DESCRIPTION

From Ferron, proceed south on Highway U-10 for 12 miles to the turnoff to Muddy Creek, which is just across from the southern Moore Road. Turn right and go 4.9 miles. Once you reach Muddy Creek, take a left across the creek for 0.1 miles to the site. From the small fenced exclosure, the 400-foot baseline stake is 65 feet west of the SW corner of the exclosure. The baseline start 400 feet north of this stake, and the 18 inch green fencepost marking the 0-foot end of the baseline has a red browse tag, #9029, attached.



Map Name: Emery West

Township 21S , Range 6E , Section 17



Diagrammatic Sketch

UTM 4316545.626 N, 477156.004 E

DISCUSSION

Trend Study No. 16C-32 (31-30)

This trend study samples a unique area within the Muddy Creek drainage. A small flat (approximately 30 acres) in the bottom of the canyon supports a stand of Wyoming big sagebrush mixed with more typical desert shrubs. Large basin big sagebrush grow in the riparian areas, while pinyon-juniper woodland and mountain mahogany dominate the slopes. The study site is adjacent to a small Forest Service exclosure. Terrain is nearly level and drainage is to the southwest into Muddy Creek. Elevation is 6,600 feet. The flat is heavily used by deer and elk and to a lesser extent, trespass cattle from private land below the Forest Service fence. Pellet group data from 1999 estimate 12 deer and 70 elk days use/acre (30 ddu/ha and 173 edu/acre). One old cow pat was also encountered. Most of the elk pellet groups were from winter, although a few were more recent.

Soil is dense and shallow with an effective rooting depth estimated at just over 10 inches. Texture is a sandy clay loam with a slightly alkaline pH (7.6). Phosphorus is limited at 5.9 ppm. Values less than 10 ppm have been shown to limit normal plant growth and development. Soil temperature is high at 72.2°F at an average depth of almost 10 inches. Percent organic matter was the lowest of all sites within this management unit (.7). Rock and pavement are rare on the surface or within the profile. Stoniness index measurements did not hit rock but instead, a compacted hard pan which varies in depth and is sometimes exposed on the surface. Beyond the hardpan, soil would be considered deep on this alluvial plain. Numerous gullies flow from the flat into the deeply cut washes. Even with the level terrain, there is obvious erosion, pedestaled plants, and large bare areas. Much of the soil on the site has eroded away. Pedestaling between plants varied from 2 to 8 inches in height.

Wyoming big sagebrush is the key browse species in this area. The population was estimated at 7,532 plants/acre in 1988 when 52% of the population was classified as young. These shrubs actually appeared fairly old and stunted. Many of the mature shrubs (2,533/acre) generally had a heavily hedged appearance, where most of the new growth was short and protected by plant browsed structure. Seed production would be affected by prolonged drought, excessively high soil temperatures, and heavy utilization. Growth and vigor appeared reduced compared to the response of plants that were protected for in the Forest Service enclosure at that time. During the 1994 reading, 3,120 sagebrush plants/acre were estimated. The number of mature and decadent plants remained nearly the same, but the number of young declined from nearly 4,000 plants/acre to only 220. Some of these differences would be due to the larger sample taken in 1994, although it appears more likely that a large number of the young sagebrush didn't survive to maturity. Utilization in 1994, was mostly light to moderate and vigor was generally good. Density has remained stable between 1994 and 1999. The number of mature plants declined and percentage of decadent plants doubled. Utilization is moderate to heavy, with nearly half of the population showing heavy use. Percent decadency has increased from 25% to 50% with 24% (380 plants/acre) classified as dying. Seedlings and young were rarely sampled.

Shadscale is co-dominant with sagebrush. This spiny plant shows light to moderate hedging with good vigor. The highly palatable bud sagebrush was also fairly common in 1988 and 1994 but was not encountered in 1999. Use is difficult to determine on these small prostrate shrubs and most were classified as lightly hedged. Low rabbitbrush is very common, with 9,466 plants/acre estimated in 1988, 4,540 in 1994 and 4,080 by 1999. These shrubs are small and generally not utilized as forage. Like sagebrush, many of the young counted in 1988 did not survive to maturity (drought and high soil temperatures). Other shrubs encountered on the site include a small number of winterfat, broom snakeweed, greasewood, and spiny horsebrush.

The herbaceous understory is typical for a mixed salt desert shrub community. All grasses combined had a cover value of only 5% in 1994 and 7% in 1999 with increased moisture. Forbs are rare and produced only about 1% cover in 1994 and 1999. Grasses include bottlebrush squirreltail, Indian ricegrass, needle-and-thread, and blue grama. Blue grama distribution is patchy, but where it occurs it dominates the

surface as large mats. It provided 42% of the grass cover in 1994 and 45% in 1999. Indian ricegrass is also common and currently ('99) produces 47% of the grass cover. The only common forb is the annual wooly plantain.

1994 TREND ASSESSMENT

Ground cover characteristics have improved somewhat since 1988. Percent bare ground has declined from 67% to 57%. This is still a high amount of bare soil. With the lack of herbaceous vegetation, erosion is still occurring. The browse trend is stable for the time being with stable populations of mature shrubs. Many young shrubs died off since the 1988 reading and few seedlings were encountered in 1994. This is likely due to the drought conditions of the past several years. Biotic and reproductive potentials of desirable shrubs have declined on the site, but a return to normal precipitation patterns will reverse this trend. The herbaceous understory is lacking on the site, although sum of nested frequencies of perennial grasses and forbs have increased slightly indicating a slightly upward trend.

TREND ASSESSMENT
soil - slightly improved but still very poor
browse - stable for mature plants
herbaceous understory - slightly improved but still poor

1999 TREND ASSESSMENT

Trend for soil is slightly improved due to a decline in percent bare ground from 57% to 53% and an increase in litter and cryptogamic cover. Erosion is still a major problem however. Trend for browse is down slightly for the key species, Wyoming big sagebrush. Density has remained stable, but recruitment is down, utilization is heavy, and percent decadence has increased from 25% to 50%. There are currently more decadent/dying sagebrush than young to replace them indicating a most likely population decline in the future. Trend for the herbaceous understory is stable with similar sum of nested frequency values for grasses and forbs compared to 1994.

TREND ASSESSMENT
soil - up slightly but still in very poor condition
browse - down slightly
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 32

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron cristatum	-	-	3	-	-	2	-	.03
G	Agropyron smithii	-	-	2	-	-	1	-	.15
G	Agropyron spicatum inerme	-	1	-	-	1	-	.15	-
G	Bouteloua gracilis	$_{a}$2	$_{b}$36	$_{b}$55	1	12	19	2.23	3.11
G	Bromus tectorum (a)	-	-	10	-	-	5	-	.02
G	Oryzopsis hymenoides	$_{a}$64	$_{b}$112	$_{b}$113	30	49	47	2.57	3.27
G	Sitanion hystrix	$_{b}$94	$_{a}$51	$_{a}$33	44	25	19	.39	.27
G	Sporobolus cryptandrus	$_{b}$5	$_{a}$-	$_{b}$13	4	-	6	-	.10
Total for Annual Grasses		0	0	10	0	0	5	0	0.02
Total for Perennial Grasses		165	200	219	79	87	94	5.34	6.95
Total for Grasses		165	200	229	79	87	99	5.34	6.98
F	Arabis spp.	1	-	-	1	-	-	-	-
F	Astragalus spp.	23	32	14	12	14	9	.12	.04
F	Calochortus nuttallii	-	-	4	-	-	2	-	.01
F	Castilleja spp.	-	2	-	-	1	-	.00	-
F	Descurainia pinnata (a)	-	1	7	-	1	3	.00	.01
F	Draba spp. (a)	-	6	-	-	2	-	.01	-
F	Eriogonum spp.	-	2	-	-	1	-	.00	-
F	Erigeron pumilus	7	5	10	3	3	5	.01	.02
F	Lappula occidentalis (a)	-	$_{b}$43	$_{a}$18	-	14	7	.07	.03
F	Machaeranthera canescens	$_{b}$11	$_{b}$19	$_{a}$-	7	12	-	.11	-
F	Plantago patagonica (a)	-	$_{a}$104	$_{b}$191	-	37	65	.45	1.08
F	Sphaeralcea coccinea	5	11	8	4	5	6	.05	.03
F	Townsendia incana	$_{c}$54	$_{b}$34	$_{a}$8	28	17	4	.25	.07
F	Unknown forb-annual (a)	-	2	-	-	1	-	.00	-
Total for Annual Forbs		0	156	216	0	55	75	0.54	1.13
Total for Perennial Forbs		101	105	44	55	53	26	0.56	0.18
Total for Forbs		101	261	260	55	108	101	1.11	1.31

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 32

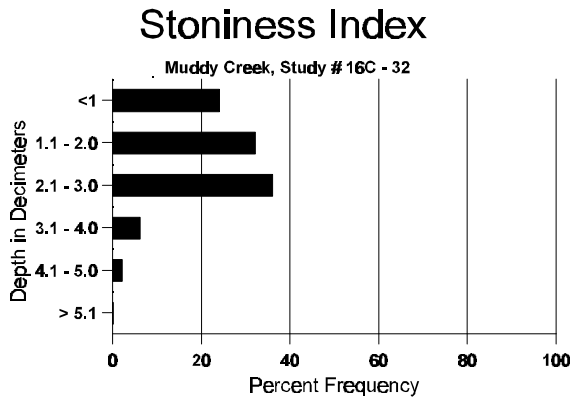
Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Artemisia spinescens	31	0	.51	-
B	Artemisia tridentata wyomingensis	69	72	3.58	4.68
B	Atriplex confertifolia	81	69	5.55	3.45
B	Ceratoides lanata	6	4	.06	.00
B	Chrysothamnus viscidiflorus	64	70	2.06	1.99
B	Gutierrezia sarothrae	1	0	-	-
B	Opuntia spp.	17	21	.40	.36
B	Sarcobatus vermiculatus	12	14	1.61	1.35
B	Sclerocactus	2	8	.03	.15
B	Tetradymia spinosa	13	14	.19	.36
Total for Browse		296	272	14.03	12.38

BASIC COVER --
Herd unit 16C, Study no: 32

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	287	288	2.50	22.87	19.34
Rock	99	16	0	.91	.50
Pavement	71	53	.75	.21	.46
Litter	370	342	20.00	14.56	17.69
Cryptogams	135	138	10.00	3.65	7.27
Bare Ground	359	348	66.75	56.71	52.81

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 32, Study Name: Muddy Creek

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.6	72.2 (9.4)	7.6	56.0	23.4	20.6	0.7	5.9	89.6	3.4



PELLET GROUP DATA --
Herd unit 16C, Study no: 32

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	10	12	n/a
Elk	35	55	70 (173)
Deer	33	9	12 (30)
Cattle	3	-	1 (2)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 32

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia spinescens																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	11	-	-	-	-	-	1	-	-	12	-	-	-	800			12
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	8	-	-	-	-	-	-	-	-	8	-	-	-	533	3	5	8
	94	36	18	-	1	-	-	-	-	-	55	-	-	-	1100	4	9	55
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	4	16	-	-	2	-	-	-	-	14	-	2	6	440			22
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+10%
'94	46%	00%	10%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	1399	Dec:	5%
'94	1560		28%
'99	0		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	88	9	-	-	-	-	-	1	-	-	10	-	-	-	666			10
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	44	5	1	-	-	-	9	-	-	59	-	-	-	3933			59
	94	11	-	-	-	-	-	-	-	-	10	-	1	-	220			11
	99	3	-	6	-	-	-	-	-	-	9	-	-	-	180			9
M	88	14	14	10	-	-	-	-	-	-	37	1	-	-	2533	15	19	38
	94	69	37	-	-	-	-	-	-	-	104	-	-	2	2120	13	17	106
	99	13	20	31	-	4	3	-	-	-	71	-	-	-	1420	13	19	71
D	88	5	9	1	-	-	-	1	-	-	16	-	-	-	1066			16
	94	22	13	4	-	-	-	-	-	-	26	-	-	13	780			39
	99	14	26	35	-	3	2	-	-	-	61	-	-	19	1600			80
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1140			57
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1240			62

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	25%	11%	00%	-59%
'94	32%	03%	10%	+ 3%
'99	33%	48%	12%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	7532	Dec:		14%
'94	3120			25%
'99	3200			50%

Atriplex confertifolia																		
S	88	15	-	-	-	-	-	-	-	-	15	-	-	-	1000			15
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	45	4	2	-	-	-	3	-	-	54	-	-	-	3600			54
	94	14	-	-	-	-	-	-	-	-	13	-	-	1	280			14
	99	35	-	-	1	-	-	-	-	-	36	-	-	-	720			36
M	88	32	6	4	-	-	-	1	-	-	43	-	-	-	2866	9	10	43
	94	241	-	-	-	-	-	-	-	-	241	-	-	-	4820	8	15	241
	99	120	16	2	-	-	-	-	-	-	138	-	-	-	2760	7	13	138
D	88	16	3	1	-	-	-	1	-	-	21	-	-	-	1400			21
	94	23	1	-	-	-	-	-	-	-	19	-	-	5	480			24
	99	31	5	-	7	-	-	-	-	-	33	-	-	10	860			43
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	11%	06%	00%	-29%
'94	.35%	00%	02%	-22%
'99	10%	.92%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	7866	Dec:		18%
'94	5580			9%
'99	4340			20%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceratoides lanata																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	1	1	3	-	-	-	1	-	-	6	-	-	-	400	6	6	6
	94	3	3	-	-	-	-	-	-	-	6	-	-	-	120	6	6	6
	99	-	-	1	-	-	-	-	-	-	1	-	-	-	20	4	5	1
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	4	-	-	1	-	-	-	5	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	11%	33%	00%	-77%
'94	43%	00%	00%	-14%
'99	00%	100%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	600	Dec:	0%
	'94	140		14%
	'99	120		83%

Chrysothamnus viscidiflorus																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	62	3	-	-	-	-	7	-	-	71	-	-	1	4800			72
	94	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
	99	16	7	-	-	-	-	-	-	-	23	-	-	-	460			23
M	88	61	3	1	-	-	-	5	-	-	70	-	-	-	4666	7	9	70
	94	209	-	-	-	-	-	2	-	-	209	-	-	2	4220	9	11	211
	99	146	24	2	-	-	-	-	-	-	153	-	19	-	3440	7	12	172
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	9	-	-	-	-	-	-	-	-	8	-	-	1	180			9
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	04%	.70%	.70%	-52%
'94	00%	00%	.88%	-10%
'99	15%	.98%	10%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	9466	Dec:	0%
	'94	4540		1%
	'99	4080		4%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	20		-
	'99	0		-

Opuntia spp.																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133	6	16	2
	94	23	-	-	-	-	-	-	-	-	23	-	-	-	460	4	16	23
	99	29	-	-	-	-	-	-	-	-	29	-	-	-	580	5	13	29
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	-	-	2	-	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+71%
'94	00%	00%	00%	+39%
'99	00%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	133	Dec:	0%
	'94	460		0%
	'99	760		5%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sarcobatus vermiculatus																		
Y	88	4	-	1	-	-	-	-	-	-	5	-	-	-	333			5
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	19	31	1
	94	20	-	-	-	-	-	-	-	-	20	-	-	-	400	17	27	20
	99	23	-	-	-	-	-	-	-	-	23	-	-	-	460	16	30	23
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	5	-	-	-	-	-	-	-	-	1	-	-	4	100			5
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	17%	00%	+ 9%
'94	00%	00%	00%	+31%
'99	00%	00%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	399	Dec:	0%
	'94	440		5%
	'99	640		16%

Sclerocactus																		
M	88	10	-	-	-	-	-	-	-	-	10	-	-	-	666	3	0	10
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120	3	4	6
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220	3	4	11
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-82%
'94	00%	00%	00%	+45%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	666	Dec:	-
	'94	120		-
	'99	220		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia spinosa																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	4	-	-	-	-	-	-	-	-	-	-	4	-	80			4
M	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66	12	16	1
	94	18	1	-	-	-	-	-	-	-	19	-	-	-	380	11	18	19
	99	23	-	1	-	-	-	-	-	-	1	-	23	-	480	4	11	24
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	-	1	-	-	-	-	-	-	1	-	-	1	40			2
	99	2	-	-	-	-	-	-	-	-	-	-	2	-	40			2
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	280			14

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+85%
'94	05%	05%	05%	+27%
'99	00%	03%	97%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	66	Dec:		0%
'94	440			9%
'99	600			7%

Trend Study 16C-33-99

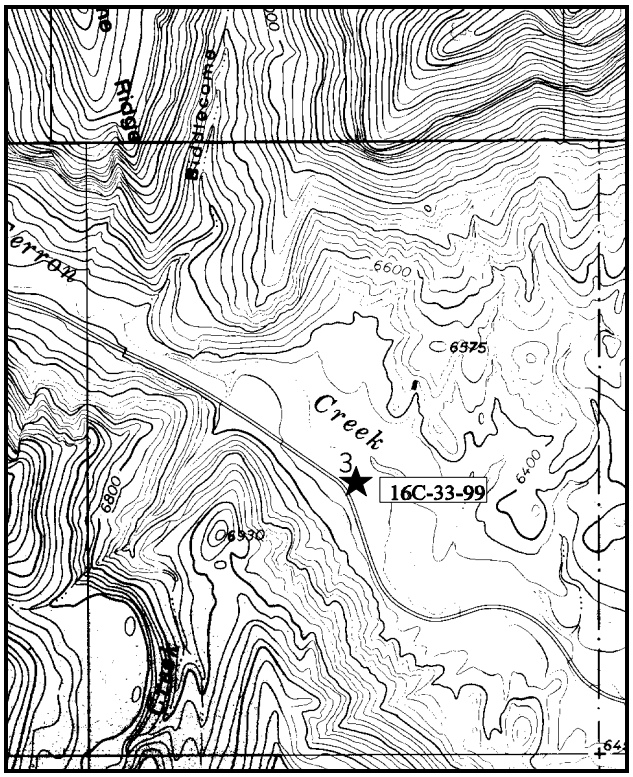
Study site name: Little Nelson Mountain . Range type: Big Sagebrush - Grass .

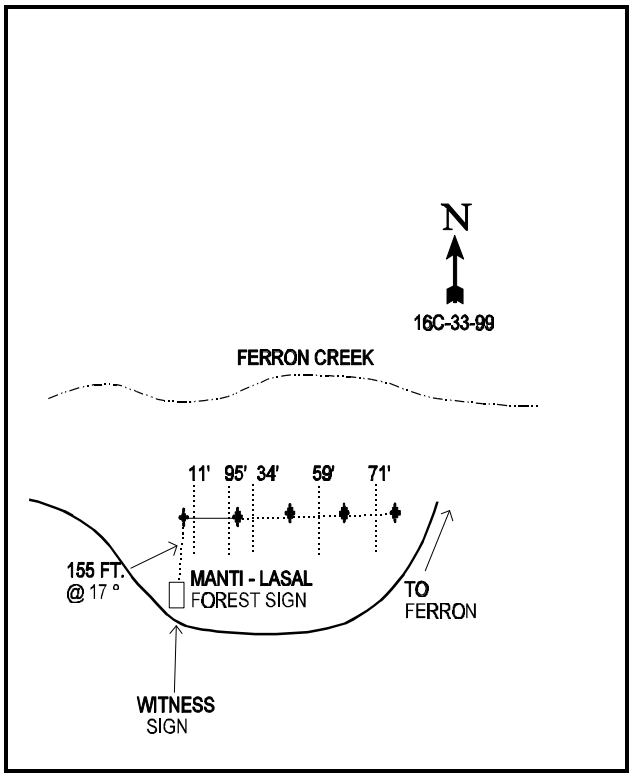
Compass bearing: frequency baseline 127°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Ferron, proceed up Ferron Canyon past Millsite State Park. Continue 0.7 miles past the forest boundary to the Manti-LaSal Forest sign. The 0-foot baseline stake is on the right hand side of the road approximately 155 feet away at a bearing of 17°M.





Map Name: Ferron Diagrammatic Sketch

Township 20S , Range 6E , Section 3 UTM 4328643.864 N, 479914.299 E

DISCUSSION

Trend Study No. 16C-33 (31-31)

The Little Nelson Mountain study in Ferron Canyon was established in 1994. It samples a dry Wyoming big sagebrush site along the banks of Ferron creek, just up stream from Millsite reservoir. The terrain at the site gently slopes north toward the creek. Elevation is approximately 6,340 feet. The area receives concentrated use from wintering deer. Pellet group data from 1999 estimate 22 deer and 17 cow days use/acre (54 ddu/ha and 42 cdu/ha). All cattle pats were from last season. The site is within the Ferron allotment but is grazed only as cattle are trailed up the road to higher pastures.

The soils are alluvially deposited and deep with some river cobble on the surface and within the profile. Effective rooting depth is estimated at just over 26 inches. Texture is a loam with a slightly alkaline pH (7.6). Phosphorus is limited at only 3.5 ppm and potassium is marginal at 67.2 ppm. Values less then 10 ppm for phosphorus and 70 ppm for potassium have been shown to limit normal plant growth and development. There is a considerable amount of exposed bare ground between individual shrubs. Percent bare ground was estimated at 52% in 1994 and 44% in 1999. Soil pedestaling is evident to a height of 4 to 6 inches in some areas. Herbaceous vegetation was lacking on the site in 1994 with grasses and forbs providing only 10% cover. Cover increased by 1999 with grasses and forbs providing almost 20% cover. Most erosion in the area comes from high intensity thunderstorm events. One such event on the day following study site establishment in 1994, washed out the road just past the reservoir.

The key browse species on the site consists of a moderately dense population of Wyoming big sagebrush. These shrubs are small with mature plants averaging only 12 inches in height with a 20 inch crown. The majority of the population is mature. Percent decadence was moderately high in 1994 at 32% with 61% of these shrubs classified as dying. By 1999, the population of mature plants has remained similar. Young plants are more abundant and percent decadence has declined to 22% due to a die off of some decadent plants since 1994. Use remains moderate to heavy but vigor is normal on most plants.

Shadscale is also abundant with an estimated population of 2,700 plants/acre in 1994 and 2,540 by 1999. Use of these small shrubs was primarily light to moderate. Several other shrubs occurred in small numbers.

The herbaceous understory is diverse and moderately abundant for this type of site. The most common grass is blue grama which accounted for 81% of the grass cover in 1994 and 76% in 1999. Other fairly common grasses include Indian ricegrass and bottlebrush squirreltail. Forbs are diverse but combined, accounted for less than one percent cover in 1994, increasing to 4% by 1999. The most abundant species include an Astragalus, hoary aster, and wooly plantain.

1994 APPARENT TREND ASSESSMENT

Protective ground cover is lacking on this site primarily due to the lack of herbaceous plants. Percent bare ground is quite high and there are large areas of exposed soil. Pedestaling is evident and during high intensity rain events there is little protective cover to hold the soil in place. A return to normal precipitation patterns will improve the herbaceous cover on the site. The key browse consists of Wyoming big sagebrush. Apparent trend for these shrubs appears stable currently. There is an adequate number of seedlings and young to replace most of the dying plants. Percent decadency is low at 32% but utilization is fairly heavy. The herbaceous understory is in poor condition. The dominant grass consists of the low growing blue grama. Forbs are scarce.

1999 TREND ASSESSMENT

Trend for soil is up due to a decline in percent cover of bare ground from 52% to 44%. Litter cover also increased slightly while vegetative cover increased from 17% to 30%. Cryptogamic cover increased as well. There is still a considerable amount of unprotected bare soil on the site and erosion continues to occur. Trend for the key species, Wyoming big sagebrush, is up slightly. Utilization is still moderate to heavy but vigor has improved, percent decadence has declined, and recruitment is up. Shadscale, which is also abundant, appears to be stable. Trend for the herbaceous understory is up. Sum of nested frequency of perennial grasses has increased slightly while frequency of perennial forbs has increased substantially. Cover of both grasses and forbs has also increased since 1994. Blue gramma is stable and currently provides 76% of the grass cover and 60% of the total herbaceous cover. Indian ricegrass and bottlebrush squirreltail are also fairly abundant and combined they produce 18% of the grass cover. Indian ricegrass has increased significantly in sum of nested frequency since 1994, while bottlebrush squirreltail has remained stable.

TREND ASSESSMENT
soil - up
browse - slightly up
herbaceous understory - up

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 33

Type	Species	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
G	Bouteloua gracilis	143	160	39	40	7.73	11.74
G	Bromus tectorum (a)	-	75	-	32	-	.40
G	Elymus salina	18	*-	6	-	.08	-
G	Hilaria jamesii	1	5	1	1	.00	.03
G	Oryzopsis hymenoides	57	*79	25	36	.86	1.37
G	Sitanion hystrix	78	70	37	38	.68	1.37
G	Sporobolus cryptandrus	12	43	7	12	.12	.52
G	Stipa comata	6	1	2	1	.03	.03
Total for Annual Grasses		0	75	0	32	0	0.40
Total for Perennial Grasses		315	358	117	128	9.52	15.08
Total for Grasses		315	433	117	160	9.52	15.48
F	Astragalus consobrinus	8	*91	5	39	.02	.77
F	Aster spp.	15	*-	5	-	.02	-
F	Castilleja spp.	1	-	1	-	.00	-
F	Cryptantha spp.	2	-	1	-	.00	-
F	Draba spp. (a)	-	25	-	9	-	.07
F	Erigeron spp.	2	14	1	4	.00	.07
F	Halogeton glomeratus (a)	2	-	1	-	.00	-
F	Lappula occidentalis (a)	9	*46	4	22	.02	.11
F	Machaeranthera canescens	4	36	2	18	.01	1.70

Type	Species	Nested Frequency '94	'99	Quadrat Frequency '94	'99	Average Cover % '94	'99
F	Plantago patagonica (a)	32	*95	10	26	.07	.91
F	Salsola iberica (a)	9	*-	3	-	.01	-
F	Sphaeralcea coccinea	13	11	7	6	.06	.10
F	Townsendia incana	15	*47	8	24	.04	.31
F	Unknown forb-perennial	4	-	2	-	.01	-
Total for Annual Forbs		52	166	18	57	0.11	1.09
Total for Perennial Forbs		64	199	32	91	0.18	2.96
Total for Forbs		116	365	50	148	0.29	4.05

* Indicates significant difference at % = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 33

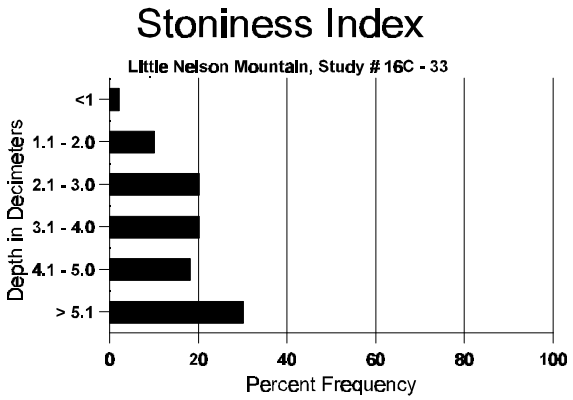
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	0	1	-	-
B	Artemisia spinescens	1	3	-	.06
B	Artemisia tridentata wyomingensis	64	66	3.45	6.78
B	Atriplex canescens	0	0	.54	-
B	Atriplex confertifolia	50	53	1.08	3.03
B	Atriplex gardneri	-	-	.98	-
B	Ceratoides lanata	4	3	.00	.00
B	Chrysothamnus nauseosus	3	0	-	-
B	Chrysothamnus viscidiflorus	3	8	.03	-
B	Eriogonum microthecum	1	0	.00	-
B	Juniperus osteosperma	0	1	-	-
B	Leptodactylon pungens	3	6	.03	.15
B	Opuntia spp.	36	36	.84	1.57
B	Sarcobatus vermiculatus	1	1	.38	.38
B	Sclerocactus	0	4	-	.01
B	Tetradymia spinosa	0	2	-	-
Total for Browse		166	184	7.36	12.00

BASIC COVER --
Herd unit 16C, Study no: 33

Cover Type	Nested Frequency '94	'99	Average Cover % '94	'99
Vegetation	311	356	16.88	30.04
Rock	240	175	3.92	4.51
Pavement	286	342	1.43	8.14
Litter	419	393	13.36	16.00
Cryptogams	94	217	2.23	9.79
Bare Ground	460	459	51.92	43.53

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 33, Study Name: Little Nelson Mountain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
26.1	55.4 (18.1)	7.6	48.0	33.4	18.6	1.5	3.5	67.2	0.6



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 33

Type	Quadrat Frequency '94	'99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	-	11	n/a
Elk	7	-	0
Deer	42	43	22 (54)
Cattle	2	3	17 (42)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 33

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing			Moderate Use		Heavy Use		Poor Vigor								%Change			
		'94	00%		00%		00%											
		'99	00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)													'94		0	Dec:		-
													'99		20			-
Artemisia spinescens																		
M	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	3	7	3
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
% Plants Showing			Moderate Use		Heavy Use		Poor Vigor								%Change			
		'94	00%		00%		00%								+86%			
		'99	00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)													'94		20	Dec:		0%
													'99		140			57%
Artemisia tridentata wyomingensis																		
S	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	99	6	1	2	-	-	-	-	-	-	9	-	-	-	180			9
Y	94	6	3	2	-	-	-	-	-	-	11	-	-	-	220			11
	99	21	15	-	3	3	2	-	-	-	44	-	-	-	880			44
M	94	30	25	27	4	-	-	-	-	-	81	-	-	5	1720	11	20	86
	99	4	17	6	4	36	20	5	-	-	92	-	-	-	1840	12	20	92
D	94	4	16	25	-	1	-	-	-	-	18	-	-	28	920			46
	99	2	-	8	-	2	17	9	-	-	26	-	-	12	760			38
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1000			50
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	960			48
% Plants Showing			Moderate Use		Heavy Use		Poor Vigor								%Change			
		'94	31%		38%		23%								+18%			
		'99	42%		30%		07%											
Total Plants/Acre (excluding Dead & Seedlings)													'94		2860	Dec:		32%
													'99		3480			22%
Atriplex canescens																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	17	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing			Moderate Use		Heavy Use		Poor Vigor								%Change			
		'94	00%		00%		00%											
		'99	00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)													'94		0	Dec:		-
													'99		0			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Atriplex confertifolia																		
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	14	-	1	-	1	-	-	-	-	16	-	-	-	320			16
Y	94	2	2	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	21	-	-	-	1	4	5	-	-	31	-	-	-	620			31
M	94	76	20	9	-	-	-	-	-	-	104	-	-	1	2100	8	16	105
	99	20	7	2	10	7	5	4	-	-	55	-	-	-	1100	8	16	55
D	94	20	5	1	-	-	-	-	-	-	15	-	-	8	520			26
	99	6	-	-	8	5	1	21	-	-	18	-	3	20	820			41
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	20%	07%	07%	- 6%
'99	16%	09%	18%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	2700	Dec:		19%
'99	2540			32%

Ceratoides lanata																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	94	2	-	1	-	-	-	-	-	-	3	-	-	-	60	6	11	3
	99	7	-	-	-	1	-	-	-	-	8	-	-	-	160	5	9	8
D	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	25%	00%	+50%
'99	13%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	80	Dec:		25%
'99	160			0%

Chrysothamnus nauseosus																		
Y	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	94	1	-	1	-	-	-	-	-	-	2	-	-	-	40	9	7	2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	33%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	60	Dec:		-
'99	0			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	8	9	3
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140	6	12	7
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+63%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	60	Dec:		-
'99	160			-

Eriogonum microthecum																		
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	2	3	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	20	Dec:		-
'99	0			-

Juniperus osteosperma																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	20			-

Leptodactylon pungens																		
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120	7	10	6
	99	12	-	-	-	-	-	-	-	-	12	-	-	-	240	5	7	12

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+42%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	140	Dec:		-
'99	240			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
Y	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	94	53	-	-	-	-	-	-	-	-	53	-	-	-	1060	4	17	53
	99	39	-	-	-	-	-	1	-	-	37	-	3	-	800	4	18	40
D	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	10	-	-	-	-	-	-	-	-	5	-	-	5	200			10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	- 4%
'99	00%	00%	15%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	1120	Dec:		2%
'99	1080			19%

Sarcobatus vermiculatus

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
M	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	16	21	1
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20	16	23	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+ 0%
'99	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	20	Dec:		-
'99	20			-

Sclerocactus

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	1	-	-	-	-	-	3	-	-	-	60	2	2	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	80			-

Tetradymia spinosa

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	25	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	3	7	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	60			-

Trend Study 16C-34-99

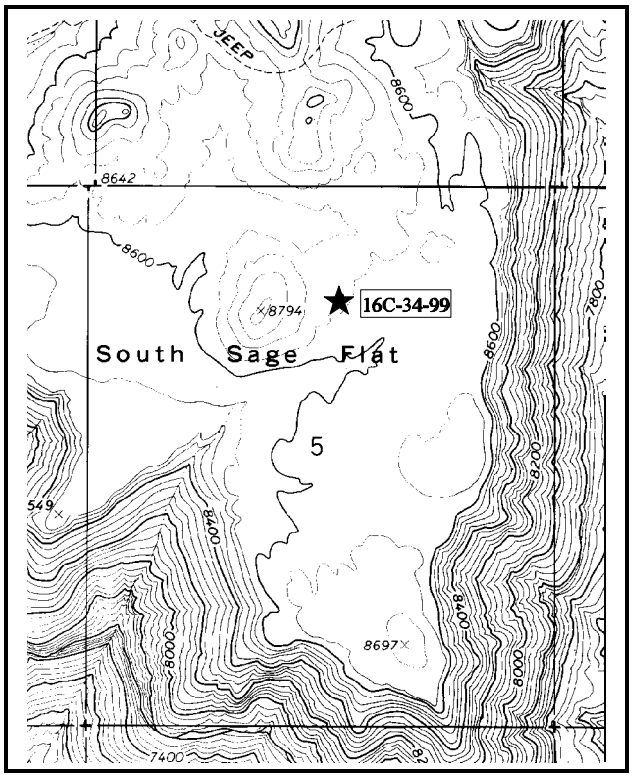
Study site name: South Sage Flat . Range type: Black Sagebrush .

Compass bearing: frequency baseline 203°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

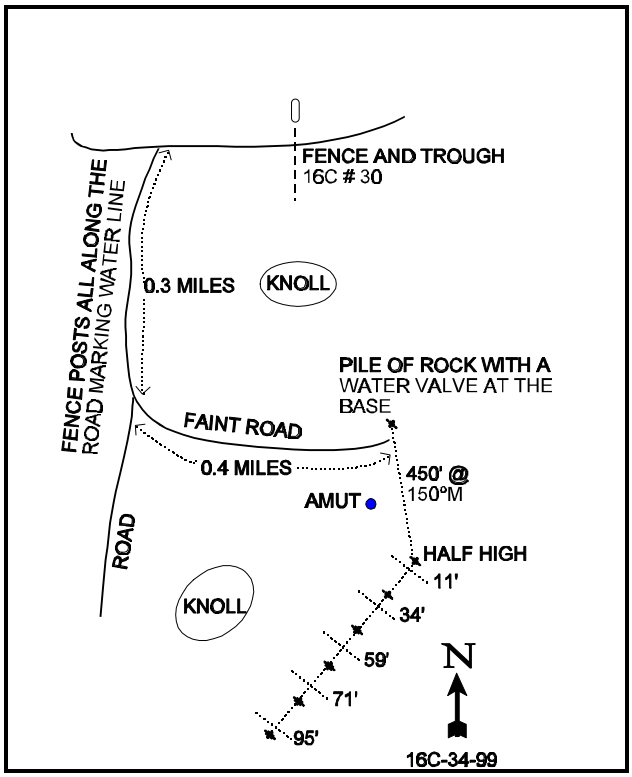
LOCATION DESCRIPTION

From the fence and turnoff at site # 16C-30 (Upper Hole Trail), proceed west 0.7 miles. Turn left and travel along a road with fenceposts marking a water line for 0.3 miles. Turn left on a faint road and travel 0.4 miles to a fencepost and a pile of rocks on the left. From the rock pile, walk 450 ft at 150/ magnetic to the 0 ft baseline stake.



Map Name: Flagstaff Peak

Township 21S , Range 6E , Section 5



Diagrammatic Sketch

UTM 4319441.488 N, 476882.669 E

DISCUSSION

Trend Study No. 16C-34 (31-32)

The South Sage Flat study was established in 1994 at South Sage Flat. It samples a black sagebrush-mountain big sagebrush/grass community south-west of Little Nelson Mountain on Forest Service land. Elevation at the site is 8,650 feet with a general east aspect and nearly level terrain. It was added to monitor the increasing elk population on the unit. Quadrat frequency of elk pellet-groups on the site is quite high at 48% in 1994 and 59% in 1999. Cattle use the area as part of the Ferron grazing allotment which is grazed from June 21 to October 5 by 1,607 cattle on an 8 pasture rest rotation system. There is a water trough about 1/4 of a mile to the north of the site. Pellet group data from 1999 estimate 1 deer, 85 elk and 31 cow days use/acre (3 ddu/ha, 210 edu/ha, 77 cdu/ha).

Soil on the site is moderately shallow with an effective rooting depth of just over 12 inches. There is a clay layer at 10 inches. Soil texture is a sandy clay loam with a neutral pH (6.9). Pavement sized rock is common on the surface and throughout the profile, with a few larger rocks scattered on the surface and many of those have a calcium carbonate coating. There is quite a bit of bare ground exposed (40% in 1994 and 38% in 1999) and light soil pedestaling evident. Erosion is minimal, however this is due mostly to the level terrain.

The key browse species on the site consists of a dense population of relatively small statured black sagebrush. Density has averaged about 14,000, mostly mature plants/acre since 1994. Utilization has been light to moderate and vigor is generally good. There is a small but stable population of mountain big sagebrush on the site, indicating areas of deeper soil. The only other abundant shrub on the site consists of a dense stand of low growing rabbitbrush. Palatability of this shrub is poor and most individuals are not utilized. Several other species of shrubs occurred on the site, although none were very abundant.

The herbaceous understory is fairly abundant and diverse with grasses and forbs accounting for almost 11% cover in 1994 and about 15% in 1999. Sum of nested frequency for grasses and forbs indicates well dispersed cover which is effective at holding the soil in place. The dominant grass is crested wheatgrass which was seeded in the past. The next most abundant grass is letterman needlegrass. Forbs are diverse and fairly abundant. The most common species include Eaton fleabane, redroot eriogonum, pingue hymenoxys, and mat penstemon.

1994 APPARENT TREND ASSESSMENT

Protective ground cover is adequate to prevent serious erosion on the site. The apparent browse trend is stable with adequate numbers of seedlings and young, and low percent decadency for the preferred browse species, black sagebrush and Mountain big sagebrush. Utilization is generally light to moderate and vigor is good. The herbaceous understory is fairly abundant and diverse providing moderately effective protective ground cover for the soil.

1999 TREND ASSESSMENT

Trend for soil is stable. Litter and vegetative cover have increased slightly, but percent cover for bare ground remains similar to 1994. There is some erosion occurring, although it is minimal due to the level terrain. The browse trend is stable for the key species, black sagebrush and mountain big sagebrush. Both show stable populations, mostly light to moderate use, good recruitment and vigor, and low decadence. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses increased slightly while frequency of perennial forbs declined slightly. Grasses provide the bulk of the herbaceous cover and crested wheatgrass accounts or 66% of the grass cover and 47% of the herbaceous cover.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 34

Type	Species	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
G	Agropyron cristatum	233	254	79	82	4.23	6.86
G	Agropyron smithii	1	6	1	2	.00	.15
G	Bromus inermis	8	3	2	2	.01	.06
G	Elymus salina	15	41	7	13	.11	.21
G	Poa fendleriana	64	40	22	17	1.03	.50
G	Sitanion hystrix	2	2	1	2	.03	.06
G	Stipa lettermani	133	120	55	50	1.95	2.49
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		456	466	167	168	7.38	10.36
Total for Grasses		456	466	167	168	7.38	10.36
F	Androsace septentrionalis (a)	-	28	-	14	-	.14
F	Arabis spp.	3	3	1	2	.00	.01
F	Astragalus convallarius	6	-	2	-	.03	-
F	Astragalus miser	3	3	1	1	.15	.03
F	Aster spp.	-	*14	-	6	-	.05
F	Castilleja linariaefolia	3	2	1	2	.01	.01
F	Chaenactis douglasii	-	4	-	1	-	.00
F	Cryptantha spp.	2	-	1	-	.00	-
F	Eriogonum alatum	3	-	2	-	.03	-
F	Erigeron eatonii	128	*49	52	27	1.05	.36
F	Erigeron pumilus	15	*2	9	1	.04	.03
F	Eriogonum racemosum	25	*65	13	28	.16	.56
F	Hymenoxys acaulis	16	*4	6	2	.10	.01
F	Hymenoxys richardsonii	51	55	23	23	.78	1.23
F	Ipomopsis aggregata	-	2	-	1	-	.03
F	Linum lewisii	2	1	1	1	.03	.03
F	Lupinus argenteus	10	3	5	1	.07	.09
F	Machaeranthera canescens	3	3	2	1	.01	.01
F	Machaeranthera grindelioides	12	10	7	4	.08	.10
F	Penstemon caespitosus	63	55	26	25	.35	1.17
F	Penstemon spp.	5	-	2	-	.01	-

Type	Species	Nested Frequency '94	'99	Quadrat Frequency '94	'99	Average Cover % '94	'99
F	Petradoria pumila	5	2	2	2	.03	.03
F	Potentilla gracilis	3	*9	1	4	.03	.07
F	Senecio multilobatus	4	*22	1	9	.00	.07
F	Sphaeralcea coccinea	3	7	2	4	.01	.07
F	Trifolium spp.	36	43	17	17	.16	.09
Total for Annual Forbs		0	28	0	14	0	0.14
Total for Perennial Forbs		401	358	177	162	3.20	4.08
Total for Forbs		401	386	177	176	3.20	4.23

* Indicates significant difference at % = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 34

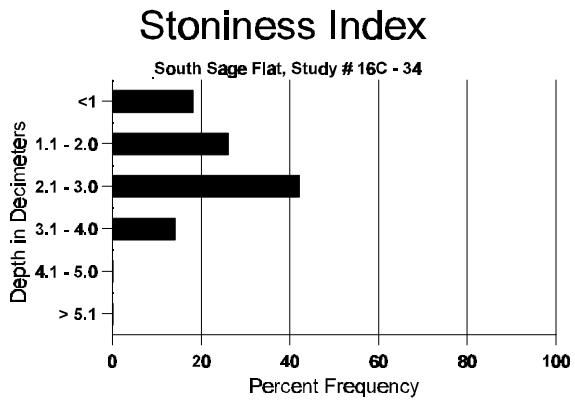
Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	0	0	-	-
B	Artemisia nova	98	100	9.90	11.98
B	Artemisia tridentata vaseyana	29	37	3.06	3.95
B	Chrysothamnus depressus	0	4	-	.15
B	Chrysothamnus viscidiflorus	92	93	3.55	7.03
B	Eriogonum corymbosum	13	13	.36	.34
B	Gutierrezia sarothrae	14	14	.03	.09
B	Leptodactylon pungens	1	2	-	-
B	Opuntia spp.	1	1	-	-
B	Symphoricarpos oreophilus	1	1	-	-
B	Tetradymia canescens	0	0	-	-
Total for Browse		249	265	16.92	23.55

BASIC COVER --
Herd unit 16C, Study no: 34

Cover Type	Nested Frequency '94	'99	Average Cover % '94	'99
Vegetation	380	387	29.04	33.97
Rock	302	106	4.80	1.56
Pavement	210	342	1.41	8.42
Litter	464	435	20.91	27.77
Cryptogams	-	9	0	.04
Bare Ground	442	425	40.17	38.25

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 34, Study Name: South Sage Flat

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.2	56.0 (12.6)	6.9	62.0	15.4	22.6	1.9	10.5	115.2	0.6



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 34

Type	Quadrat Frequency '94	'99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	10	15	n/a
Elk	48	59	85 (210)
Deer	12	8	1 (2)
Cattle	4	8	31 (77)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 34

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	11	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
	99	33	-	-	1	-	-	-	-	-	35	-	-	-	700			35
Y	94	33	23	13	-	-	-	-	-	-	69	-	-	-	1380			69
	99	133	2	-	-	-	-	-	-	-	135	-	-	-	2700			135
M	94	436	62	18	-	-	-	-	-	-	516	-	-	-	10320	6	16	516
	99	312	89	27	-	-	-	-	-	-	428	-	-	-	8560	6	15	428
D	94	73	33	4	-	-	-	-	-	-	95	-	-	15	2200			110
	99	114	23	2	3	-	-	1	-	-	106	-	2	35	2860			143
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	440			22
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	520			26

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	17%	05%	02%	+ 2%
'99	16%	04%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	13900	Dec:		16%
'99	14120			20%

Artemisia tridentata vaseyana																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
Y	94	4	5	-	-	-	-	-	-	-	9	-	-	-	180			9
	99	18	-	-	-	-	-	-	-	-	18	-	-	-	360			18
M	94	49	18	-	-	-	-	-	-	-	67	-	-	-	1340	14	30	67
	99	33	9	17	-	-	-	-	-	-	59	-	-	-	1180	14	27	59
D	94	3	1	-	-	-	-	-	-	-	2	-	-	2	80			4
	99	5	2	-	-	-	-	-	-	-	6	-	-	1	140			7
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	30%	00%	03%	+ 5%
'99	13%	20%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	1600	Dec:		5%
'99	1680			8%

Chrysothamnus depressus																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	2	5	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	100			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
Y	94	22	-	-	-	-	-	-	-	-	22	-	-	-	440			22
	99	64	2	-	-	-	-	-	-	-	66	-	-	-	1320			66
M	94	450	-	-	1	-	-	-	-	-	451	-	-	-	9020	4	8	451
	99	544	5	-	-	-	-	-	-	-	549	-	-	-	10980	3	8	549
D	94	4	1	-	-	-	-	-	-	-	5	-	-	-	100			5
	99	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	.20%	00%	00%	+23%
'99	01%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	9560	Dec:		1%
'99	12480			1%

Eriogonum corymbosum																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	1	-	-	-	-	-	-	1	-	-	-	40			2
M	94	14	-	-	-	-	-	-	-	-	14	-	-	-	280	9	19	14
	99	11	4	-	-	-	-	-	-	-	15	-	-	-	300	12	21	15
D	94	1	1	-	-	-	-	-	-	-	1	-	-	1	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	06%	00%	06%	+ 6%
'99	24%	06%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	320	Dec:		13%
'99	340			0%

Gutierrezia sarothrae																		
Y	94	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	94	28	-	-	-	-	-	-	-	-	28	-	-	-	560	5	7	28
	99	21	-	-	1	-	-	-	-	-	22	-	-	-	440	5	6	22
D	94	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	06%	-16%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	640	Dec:		6%
'99	540			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Leptodactylon pungens																		
M	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	6	2
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+67%
'99	00%	00%	33%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	20	Dec:		0%
'99	60			33%

Opuntia spp.																		
M	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40	2	5	2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	40	Dec:		0%
'99	40			50%

Symphoricarpos oreophilus																		
M	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	14	38	1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	27	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+ 0%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	20	Dec:		-
'99	20			-

Tetradymia canescens																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	8	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	0			-

Trend Study 16C-35-99

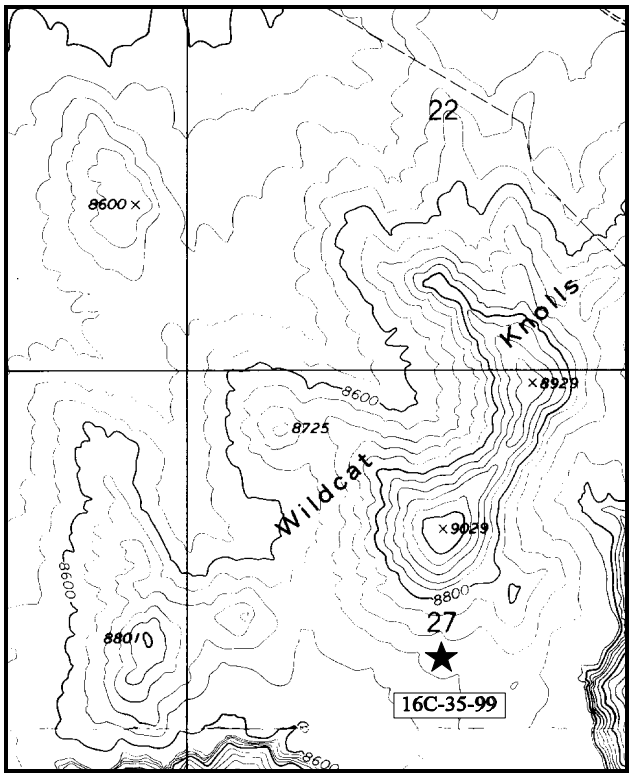
Study site name: Wildcat Knoll . Range type: Sagebrush-Grass .

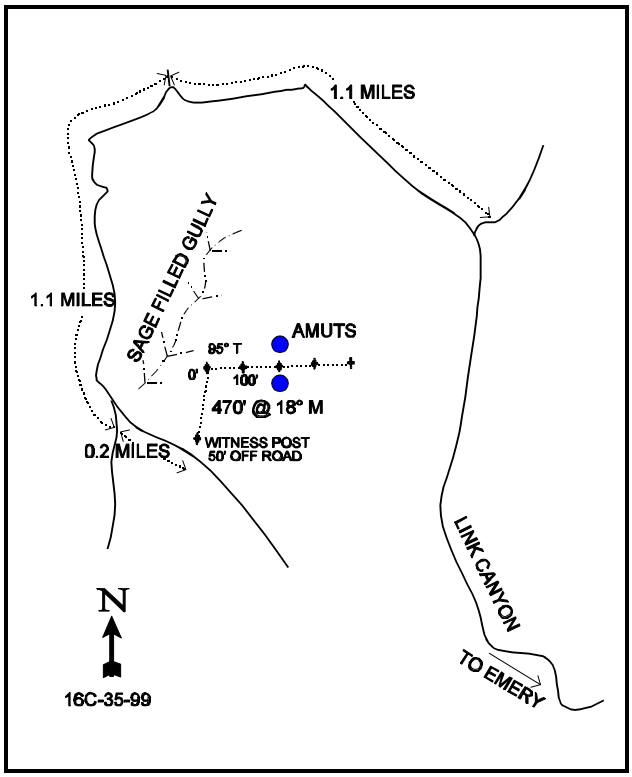
Compass bearing: frequency baseline 95°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), and line 5 (95 ft).

LOCATION DESCRIPTION

From Center St. in Emery, travel west 1.2 miles. Turn right onto a dirt road and proceed for 0.6 miles. Turn left and travel 8.7 miles (1.7 miles from turnoff to site 16C-31). Bear left at the fork and travel 1.1 miles to another fork. Stay left on F.S. #344 for 1.1 miles to another fork (at 0.1 miles on F.S. #344, go left at the fork). At the fork, bear left and travel 0.2 miles to a witness post. From the witness post to the 0 ft baseline stake, walk 470 ft at a bearing of 18°M. The 0 ft stake has browse tag #485 attached.





Map Name: Emery West Diagrammatic Sketch

Township 21S , Range 5E , Section 27 UTM 4312156.702 N, 470095.514 E

DISCUSSION

Trend Study No. 16C-35 (31-33)

This is a new site established near Wildcat Knolls in 1994. It samples a Mountain big and black sagebrush/grass community which considered important for elk. The site has a general south aspect with a gentle slope of 3-5% at an elevation of 8,700 feet. Quadrat frequency for elk pellet-groups is high at 65% in 1994 and 51% in 1999. Pellet group data from 1999 estimate 9 deer, 109 elk and 29 cow days use/acre (22 ddu/ha, 269 edu/ha, 72 cdu/ha). Nearly all of the elk and deer pellet groups were from the previous winter, although a few were more recent. Most of the cattle pats appear to be from last season. There is very little escape or thermal cover on the site. About ½ mile away there is good cover provided by Ponderosa pine trees. This area is part of the Emery allotment which is grazed from June 16 to September 30 by 1,387 cows on a 5 pasture rest rotation system. Water is limited here with guzzlers fairly close, about 3/4 of a mile from the site.

Soil depth varies on the site with deeper soils along the shallow ravine corridors where mountain big sagebrush, snowberry, woods rose, and large serviceberry shrubs grow. In between these wetter areas, the soil is more shallow and dry. Black sagebrush, rabbitbrush dominate here. Effective rooting depth averages just over 11 inches along the study site baseline. It has a sandy clay loam texture with a slightly acid pH (6.4). Parent material is limestone. There is little rock and pavement on the surface or in the profile, yet there is a hard compaction layer at about 8 to 12 inches in depth. There is some slight to moderate pedestaling of soil around the base of plants and there is a small gully on the site. However, protective ground cover appears adequate to control most erosion.

There are several varieties of palatable browse on the site including serviceberry, black sagebrush, mountain big sagebrush, antelope bitterbrush, and snowberry. Serviceberry occurs on areas with wetter and deeper soils. Individual serviceberry plants are large, highlined, and mostly unavailable. Mountain big sagebrush dominates the drainage corridors with a mostly mature population of about 4,500 plants/acre. Black sagebrush, dwarf rabbitbrush, and low rabbitbrush dominating the drier areas. It appears that there was a problem identifying dwarf rabbitbrush (*Chrysothamnus depressus*) and low rabbitbrush (*Chrysothamnus viscidiflorus*). Data from 1999 classified most of the rabbitbrush as low rabbitbrush. Both sagebrush species display light to moderate hedging, good vigor, and low decadency rates. Density of mountain big sagebrush has remained stable since 1994, while black sagebrush has increased from 4,740 to 8,020 plants/acre. The number of mature plants have remained stable but young plants have increased from 40 to 2,420 plants/acre. Density of decadent black sagebrush also increased but percent decadence is still relatively low at only 17%.

Herbaceous vegetation is diverse and abundant making up 50% of the vegetation cover on the site. Grasses provided 11% cover in 1994, increasing to 16% by 1999. The dominant species are mutton bluegrass, letterman needlegrass, and Salina wildrye which currently provide 89% of the grass cover. Forbs are diverse yet only a few species are common. The most abundant are three species of Astragalus, sulfur eriogonum, and redroot eriogonum. Utilization of grasses was light in 1999, while some of the large Astragalus showed heavy use.

1994 APPARENT TREND ASSESSMENT

Protective ground cover combined with the gentle terrain prevents serious erosion on the site. Browse species are diverse and abundant. The preferred species appear to have stable populations with low decadency rates and light to moderate utilization. The browse trend appears to be stable with the only negative aspect the abundance of less desirable dwarf rabbitbrush. The herbaceous understory is abundant and diverse. However, the grasses are dominated by the less preferred letterman needlegrass and Salina wildrye. Several more desirable species exist in small numbers including bluebunch wheatgrass, slender wheatgrass, *Carex spp*, Indian ricegrass, and bottlebrush squirreltail. Several desirable forbs are found on the site.

1999 TREND ASSESSMENT

Trend for soil is considered stable. Percent cover of bare ground has decreased slightly while vegetation cover has increased. Litter cover has remained similar. The increase in vegetation cover comes primarily from an increase in shrub cover. Herbaceous cover increased, but sum of nested frequency of grasses and forbs declined. Trend for browse is up for black sagebrush and stable for mountain big sagebrush. Black sagebrush density has nearly doubled due to a dramatic increase in young plants from 40 to 2,420 plants/acre. Use is heavier, although vigor is good and percent decadence has remained low. Mountain big sagebrush has a stable density with light to moderate use. Vigor remains good and decadency relatively low. The only other common shrub is low rabbitbrush (*Chrysothamnus viscidiflorus*) which was called dwarf rabbitbrush in 1994 (*Chrysothamnus depressus*). Combined density of these shrubs has increased slightly from 12,420 to 13,520 plants/acre. The population is mostly mature and not utilized. Overall, the browse trend is considered up slightly. Trend for the herbaceous understory is down slightly. Cover for grasses and forbs has increased but sum on nested frequency has declined slightly. Nested frequency of Salina wildrye, Carex, mutton bluegrass and letterman needlegrass have declined significantly.

TREND ASSESSMENT
soil - stable
browse - up slightly
herbaceous understory - down slightly

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 35

Type	Species	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
G	Agropyron spicatum	3	4	1	2	.03	.03
G	Agropyron trachycaulum	42	36	12	14	.13	.34
G	Carex spp.	99	105	32	40	.21	.67
G	Elymus salina	253	*144	71	40	4.10	5.76
G	Oryzopsis hymenoides	20	11	6	3	.25	.04
G	Poa fendleriana	177	*231	62	70	1.85	5.41
G	Sitanion hystrix	11	3	4	3	.02	.04
G	Stipa comata	-	*23	-	10	-	.56
G	Stipa lettermani	225	*145	78	52	4.43	3.38
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		830	702	266	234	11.04	16.26
Total for Grasses		830	702	266	234	11.04	16.26
F	Agoseris glauca	-	*8	-	4	-	.09
F	Antennaria rosea	4	11	2	4	.06	.36
F	Astragalus convallarius	17	*8	9	3	.12	.01
F	Astragalus miser	35	38	16	18	.57	.93
F	Astragalus spp.	5	9	3	6	.16	.66
F	Castilleja chromosa	10	5	4	3	.04	.01
F	Castilleja linariaefolia	28	19	11	9	.05	.12

Type	Species	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
F	Calochortus nuttallii	2	6	1	3	.00	.01
F	Chaenactis douglasii	3	-	1	-	.00	-
F	Cirsium spp.	1	-	1	-	.00	-
F	Crepis acuminata	40	*-	18	-	.14	-
F	Eriogonum alatum	-	3	-	2	-	.03
F	Erigeron eatonii	44	*16	19	9	.12	.09
F	Eriogonum racemosum	44	38	22	16	.14	.41
F	Eriogonum umbellatum	38	23	12	10	.40	.51
F	Linum lewisii	-	*6	-	3	-	.04
F	Lomatium spp.	-	1	-	1	-	.00
F	Lupinus argenteus	1	10	1	4	.01	.25
F	Lygodesmia spp.	-	1	-	1	-	.03
F	Machaeranthera canescens	6	9	2	3	.03	.04
F	Machaeranthera grindelioides	-	1	-	1	-	.03
F	Mertensia spp.	8	-	4	-	.09	-
F	Penstemon carnosus	1	1	1	1	.03	.01
F	Penstemon spp.	-	*8	-	4	-	.19
F	Senecio multilobatus	-	2	-	1	-	.03
F	Taraxacum officinale	-	3	-	2	-	.01
F	Zigadenus paniculatus	4	-	1	-	.00	.00
Total for Annual Forbs		0	0	0	0	0	0
Total for Perennial Forbs		291	226	128	108	2.00	3.91
Total for Forbs		291	226	128	108	2.00	3.91

* Indicates significant difference at % = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 35

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	1	2	1.76	2.29
B	Artemisia frigida	1	1	-	-
B	Artemisia nova	58	67	3.20	6.18
B	Artemisia tridentata vaseyana	56	55	4.34	6.98
B	Chrysothamnus depressus	80	5	2.73	-
B	Chrysothamnus nauseosus	2	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	13	88	.41	3.90
B	Eriogonum corymbosum	4	5	.03	-
B	Opuntia spp.	3	0	.18	.00
B	Purshia tridentata	1	0	.63	.38
B	Rosa woodsii	0	2	.00	.06
B	Symphoricarpos oreophilus	6	1	.60	.15
B	Tetradymia canescens	4	4	.03	-
Total for Browse		229	230	13.94	19.96

CANOPY COVER --
Herd unit 16C, Study no: 35

Species	Percent Cover '99
Amelanchier utahensis	3

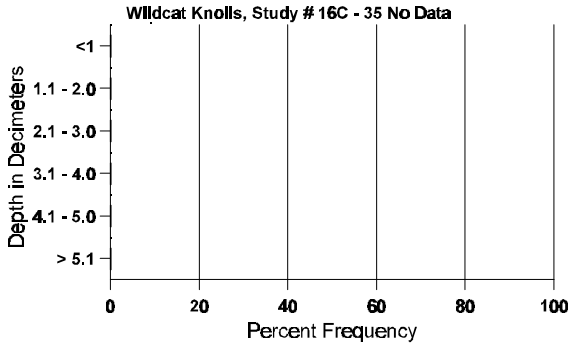
BASIC COVER --
Herd unit 16C, Study no: 35

Cover Type	Nested Frequency '94	'99	Average Cover % '94	'99
Vegetation	437	439	33.81	43.76
Rock	55	9	.26	.04
Pavement	65	50	.12	.13
Litter	490	465	47.01	45.68
Cryptogams	1	-	.00	0
Bare Ground	397	309	30.31	24.97

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 35, Study Name: Wildcat Knolls

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.4	55.6 (14.5)	6.4	60.0	15.4	24.6	2.7	10.9	182.4	0.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 35

Type	Quadrat Frequency '94	'99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	10	4	n/a
Elk	65	51	109(269)
Deer	24	5	9 (22)
Cattle	7	3	29 (72)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 35

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
M	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20	74	88	1
	99	-	-	1	-	-	-	1	-	-	2	-	-	-	40	93	115	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	100%	00%	00%	+50%
'99	00%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'94	20		-
	'99	40		-

Artemisia frigida																		
M	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-50%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'94	80		-
	'99	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	94	34	-	-	-	-	-	-	-	-	34	-	-	-	680			34
	99	4	1	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	61	58	2	-	-	-	-	-	-	121	-	-	-	2420			121
M	94	81	114	-	8	-	-	-	-	-	203	-	-	-	4060	10	16	203
	99	28	119	63	-	-	2	-	-	-	207	5	-	-	4240	8	15	212
D	94	9	23	-	-	-	-	-	-	-	18	-	-	14	640			32
	99	7	35	21	-	-	5	-	-	-	63	-	-	5	1360			68
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	340			17
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	58%	00%	06%	+41%
'99	53%	23%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'94	4740	Dec:	14%
	'99	8020		17%

Artemisia tridentata vaseyana																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
Y	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	39	36	-	-	-	-	-	-	-	73	2	-	-	1500			75
M	94	44	158	-	1	-	-	-	-	-	203	-	-	-	4060	34	36	203
	99	61	63	1	-	-	-	-	-	-	125	-	-	-	2500	19	29	125
D	94	3	17	-	-	-	-	-	-	-	17	-	-	3	400			20
	99	16	7	4	1	-	-	-	-	-	20	-	-	8	560			28
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	580			29
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	380			19

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	77%	00%	01%	+ 1%
'99	46%	02%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'94	4520	Dec:	9%
	'99	4560		12%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
S	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	94	549	-	-	-	-	-	-	-	-	549	-	-	-	10980	3	7	549
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4	7	5
D	94	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-99%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	11160	Dec:		2%
'99	120			0%

Chrysothamnus nauseosus																		
M	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	18	18	3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'94	60	Dec:	-
'99	0		-

Chrysothamnus viscidiflorus viscidiflorus																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	80	11	-	-	-	-	-	-	-	91	-	-	-	1820			91
M	94	62	-	-	-	-	-	-	-	-	62	-	-	-	1240	7	8	62
	99	478	89	-	-	-	-	-	-	-	567	-	-	-	11340	5	9	567
D	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+91%
'99	15%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'94	1260	Dec:	2%
'99	13400		2%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum corymbosum																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100	11	16	5
	99	3	1	-	-	-	-	-	-	-	4	-	-	-	80	14	18	4
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+38%
'99	13%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	100	Dec:		0%
'99	160			13%

Opuntia spp.																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	3	10	4
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'94	100	Dec:	-
'99	0		-

Purshia tridentata																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	23	26	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	69	0
D	94	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	100%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'94	20	Dec:	100%
'99	0		0%

Rosa woodsii																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'94	0	Dec:	-
'99	120		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
M	94	10	4	-	1	-	-	-	-	-	15	-	-	-	300	13	23	15
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	20	39	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	27%	00%	00%	-93%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	300	Dec:		-
'99	20			-

Tetradymia canescens																		
Y	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	2	-	-	2	-	-	-	-	-	4	-	-	-	80			4
M	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120	7	9	6
	99	-	-	2	-	-	-	-	-	-	2	-	-	-	40	6	7	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-14%
'99	00%	33%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	140	Dec:		-
'99	120			-

Trend Study 16C-36-99

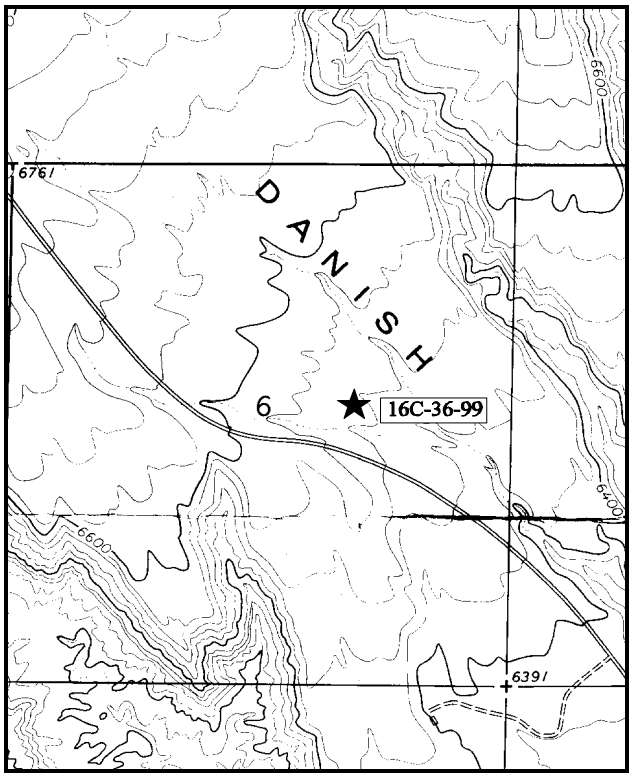
Study site name: Danish Bench . Range type: Chained, Seeded P-J .

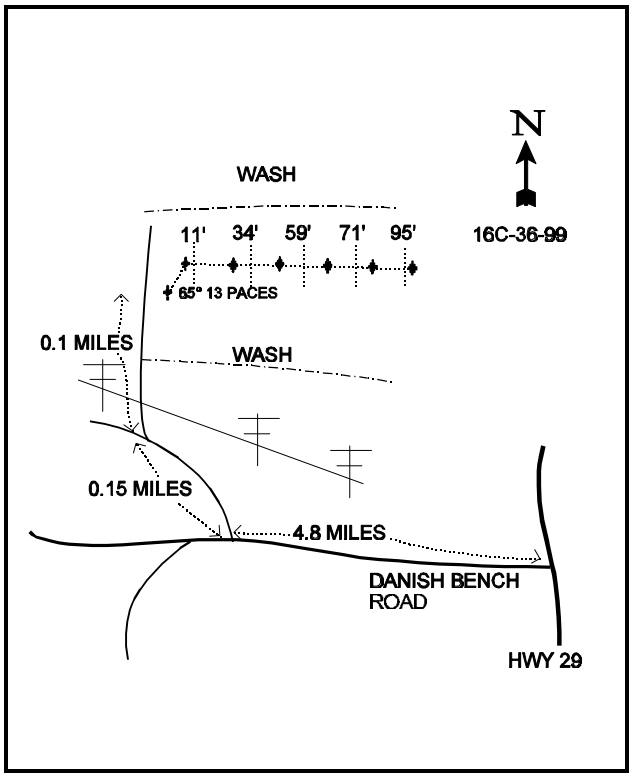
Compass bearing: frequency baseline 95°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Highway 29 between Orangeville and Castle Dale, travel up Danish Bench Road (550 West) 4.8 miles. Turn right and proceed 0.15 miles to a fork in the road. Take the right fork and travel 0.1 mile to a witness post on the right hand side of the road. From the witness post to the 0-foot baseline stake, walk 13 paces at 65°M.





Map Name: Red Point Diagrammatic Sketch

Township 18S , Range 8E , Section 6 UTM 4348599.102 N, 494385.104 E

DISCUSSION

Trend Study No. 16C-36 (31-34)

This is a new study at Danish Bench was established in 1994, replacing study16C-16 (31-14), Church Mine Road, which has shown little wildlife use over the past several years. The new site is about ½ mile north and is more representative of important big game winter range in the area. This study also samples a seeded pinyon-juniper chaining similar to the Church Mine road study. The aspect is south with a gentle slope of 5%. Elevation is approximately 6,530 feet. Pellet group data from 1999 estimates 17 deer, 76 elk and 12 cow days use/acre (42 ddu/ha, 188 edu/ha, 30 cdu/ha). The area is on land administered by the BLM and lies within the Wilberg allotment which allows 89 cows to graze from November 1 to December 15 and again from April 16 to June 15 on two pastures.

The soil is moderately shallow and rocky with some large rocks on the surface and within the soil profile. Effective rooting depth is estimated at almost 13 inches. Soil texture is a sandy clay loam with a slightly alkaline pH (7.5). Percent organic matter is limited at only 1.8%. Phosphorus is also marginal at 7.8 ppm. Values less than 10 ppm have been shown to limit normal plant growth and development. Rock and pavement cover are high at 25% in 1994 and 30% in 1999. Litter cover is relatively low at 24% in 1994 and 21% in 1999, leaving a considerable amount of unprotected bare soil. Total vegetation cover is low at only 17% to 18%. There is some localized soil movement noticeable, yet erosion is minimal due to the gentle terrain and adequate protective ground cover.

The dominant browse on the site consists of a moderately low population of black sagebrush. There was an estimated 1,540 mostly mature plants/acre in 1994. No decadent plants were encountered and utilization was light. By 1999 the population had increased slightly to 1,700 plants/acre. Utilization is moderate to heavy, but vigor is normal and percent decadence is low at 13%. Small numbers of other desirable shrubs occur on the site. These include true mountain mahogany, green ephedra, and antelope bitterbrush. Juniper and pinyon trees are regrowing on the site. They provided 37% of the browse cover in 1994 and 41% in 1999. Point quarter data from 1994 and 1999 estimated an average of 110 juniper and 56 pinyon trees/acre. Average diameter of the juniper is currently 2.6 inches, while pinyon averages 2 inches. Most of the released trees were in the 4 to 6 foot height class.

The herbaceous understory makes up only 9% cover on the site and is dominated by crested wheatgrass which provided 66% of the grass cover in 1994 and 92% in 1999. Indian rice grass was also fairly abundant in 1994, but has since declined significantly in nested frequency. Forbs are insignificant. They make up just over 1% total cover and are dominated by native, golden cryptantha and pingue hymenoxys.

1994 APPARENT TREND ASSESSMENT

Protective ground cover seems well distributed and erosion is currently minimal. Further increases in tree density will come at the cost of herbaceous plants. This will eventually increase the erosion problems on this site. The browse component contains several preferred species of shrubs yet none are very abundant. Black sagebrush is the only abundant shrub and the trend for this species appears stable due to a good reproductive potential (14%), low decadency, and light utilization. The herbaceous understory is diverse but not very abundant.

1999 TREND ASSESSMENT

Trend for soil is stable due to similar ground cover characteristics compared to 1994. There is some localized erosion occurring but it is not serious due to the gentle terrain combined with the well distributed protective ground cover. Trend for browse is also stable. Black sagebrush has increased slightly in density, while showing heavier use. Green ephedra provides some additional browse forage on the site. It has increased

from 60 to 340 plants/acre since 1994. Use is moderate to heavy with vigor poor on 35% of the plants sampled There are several other shrub species on the site yet they occur in very small numbers. Trend for the herbaceous understory is stable but poor. Total cover of grasses and forbs provide only 9% cover. Sum of nested frequency of perennial grasses has declined slightly while frequency of forbs has increased. Crested wheatgrass is still dominant and currently provides 92% of the grass cover and 78% of the herbaceous cover. Indian ricegrass was moderately abundant in 1994, although it has since declined significantly in nested frequency. Forbs are insignificant and currently provide only about 1% cover. Several new species were encountered in 1999.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable but poor

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 36

Type	Species	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
G	Agropyron cristatum	279	299	91	90	5.41	6.72
G	Agropyron intermedium	3	-	1	-	.00	-
G	Elymus junceus	5	3	1	1	.00	.15
G	Elymus salina	2	-	1	-	.06	-
G	Oryzopsis hymenoides	54	*29	19	13	2.64	.41
G	Sitanion hystrix	5	-	2	-	.01	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		348	331	115	104	8.14	7.28
Total for Grasses		348	331	115	104	8.14	7.28
F	Caulanthus crassicaulis	12	2	3	2	.04	.01
F	Cryptantha confertiflora	53	*15	25	7	1.23	.28
F	Eriogonum alatum	9	11	5	8	.03	.12
F	Euphorbia fendleri	21	15	9	8	.04	.04
F	Gilia spp. (a)	-	1	-	1	-	.00
F	Hymenoxys acaulis	23	*35	11	19	.08	.32
F	Hymenoxys richardsonii	-	*16	-	6	-	.08
F	Leucelene ericoides	-	4	-	2	-	.06
F	Machaeranthera grindelioides	-	3	-	1	-	.03
F	Penstemon spp.	-	*20	-	10	-	.07
F	Penstemon pachyphyllus	8	2	2	1	.03	.00
F	Schoencrambe linifolia	-	2	-	1	-	.00
F	Thlaspi montanum	-	3	-	1	-	.00
F	Thelesperma subnudum	7	*-	3	-	.01	-
F	Townsendia spp.	-	*68	-	28	-	.26

Type	Species	Nested Frequency '94	'99	Quadrat Frequency '94	'99	Average Cover % '94	'99
F	Unknown forb-perennial	4	-	2	-	.01	-
Total for Annual Forbs		0	1	0	1	0	0.00
Total for Perennial Forbs		137	196	60	94	1.48	1.30
Total for Forbs		137	197	60	95	1.48	1.30

* Indicates significant difference at % = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 36

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Artemisia nova	18	21	1.16	1.79
B	Cercocarpus montanus	1	1	1.08	.78
B	Cowania mexicana stansburiana	0	0	-	-
B	Echinocereus spp.	0	0	-	-
B	Ephedra viridis	2	9	2.01	1.77
B	Eriogonum microthecum	29	26	.09	.07
B	Gutierrezia sarothrae	0	5	-	.04
B	Juniperus osteosperma	0	5	2.76	2.77
B	Opuntia spp.	0	0	-	-
B	Pinus edulis	0	2	.15	.38
B	Purshia tridentata	3	1	.00	.15
B	Yucca harrimaniae	2	2	.63	-
Total for Browse		55	72	7.92	7.77

CANOPY COVER --
Herd unit 16C, Study no: 36

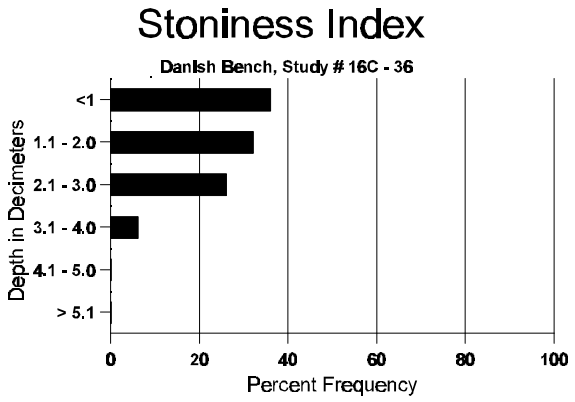
Species	Percent Cover '99
Juniperus osteosperma	.80

BASIC COVER --
Herd unit 16C, Study no: 36

Cover Type	Nested Frequency '94	'99	Average Cover % '94	'99
Vegetation	331	350	16.53	17.78
Rock	399	291	16.90	13.17
Pavement	412	400	7.61	16.29
Litter	455	402	23.86	20.95
Cryptogams	16	83	.06	1.53
Bare Ground	398	412	29.31	30.11

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 36, Study Name: Danish Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.8	55.4 (14.3)	7.5	56.0	21.4	22.6	1.8	7.8	140.8	0.9



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 36

Type	Quadrat Frequency '94	'99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	36	29	n/a
Elk	22	57	76 (188)
Deer	19	10	17 (42)
Cattle	-	3	12 (30)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 36

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	94	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	94	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
	99	18	-	1	-	-	-	-	-	-	19	-	-	-	380			19
M	94	64	2	-	-	-	-	-	-	-	66	-	-	-	1320	11	19	66
	99	15	31	9	-	-	-	-	-	-	55	-	-	-	1100	6	16	55
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	6	5	-	-	-	-	-	-	-	10	-	-	1	220			11
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	03%	00%	00%	+ 9%
'99	42%	12%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	1540	Dec:		0%
'99	1700			13%

Cercocarpus montanus																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	94	-	-	1	-	-	-	-	-	-	1	-	-	-	20	46	55	1
	99	-	1	-	-	-	-	-	-	-	1	-	-	-	20	50	55	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	100%	00%	+ 0%
'99	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	20	Dec:		-
'99	20			-

Cowania mexicana stansburiana																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	23	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	0			-

Echinocereus spp.																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	17	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	0			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ephedra viridis																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	31	46	3
	99	3	5	5	-	-	-	-	-	-	8	-	5	-	260	32	42	13
D	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+82%
'99	29%	29%	35%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	60	Dec:		0%
'99	340			12%

Eriogonum microthecum																		
S	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	94	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	99	3	1	3	-	-	-	-	-	-	7	-	-	-	140			7
M	94	78	-	-	9	-	-	-	-	-	87	-	-	-	1740	2	4	87
	99	45	3	1	-	-	-	-	-	-	49	-	-	-	980	1	3	49
D	94	1	-	-	-	-	-	-	-	-	1	-	-	-	40			2
	99	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-38%
'99	07%	07%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	1880	Dec:		2%
'99	1160			3%

Gutierrezia sarothrae																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	17	-	-	-	-	-	-	-	-	17	-	-	-	340			17
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	9	0
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120	4	4	6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	460			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	120			-

Opuntia spp.																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	12	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	16	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	0			-

Pinus edulis																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	1	-	1	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	50%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	40			-

Purshia tridentata																		
M	94	3	-	-	-	-	-	-	-	-	3	-	-	-	60	19	22	3
	99	-	-	-	-	-	1	-	-	-	1	-	-	-	20	19	22	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-67%
'99	00%	100%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	60	Dec:		-
'99	20			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Yucca harrimaniae																		
M	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80	14	25	4
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	9	12	2
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	-50%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	80	Dec:		-
'99	40			-

Trend Study 16C-37-99

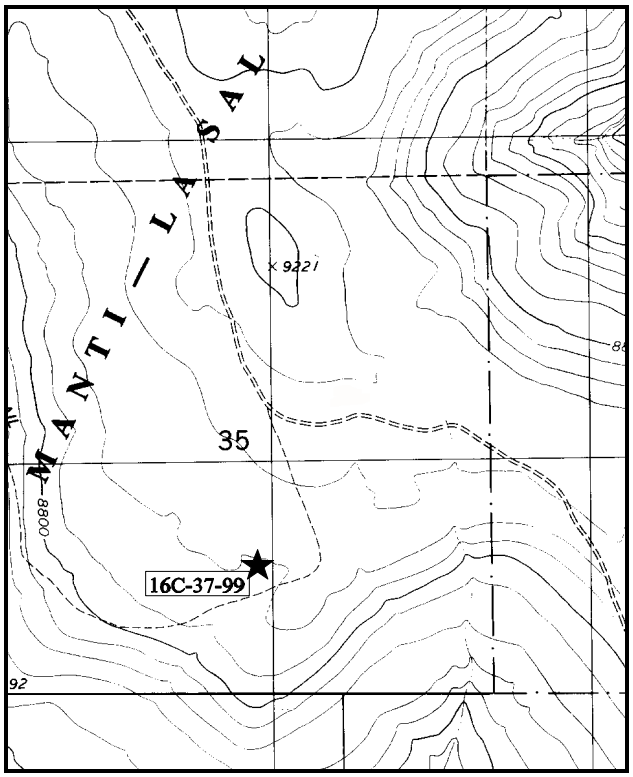
Study site name: Joes Valley Overlook . Range type: Mixed Mountain Brush .

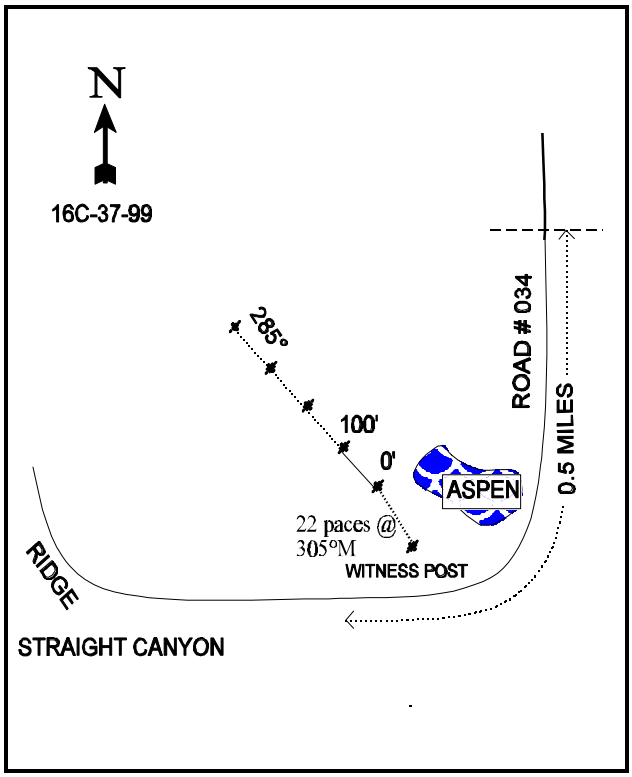
Compass bearing: frequency baseline 285°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95 ft).

LOCATION DESCRIPTION

From the intersection of Cottonwood Canyon (#040) road and Trail Mountain road, travel south 10.1 miles to a cattleguard. From the cattleguard continue 0.5 miles to a witness post. From the witness post to the 0-foot baseline stake, walk 22 paces at a bearing of 305°M. The stake has browse tag #28 attached. The witness post is a tall post on a dirt mound near the end of a contour trench.





Map Name: Mahogany Point

Diagrammatic Sketch

Township 17S , Range 6E , Section 35

UTM 4349532.535 N, 481706.803 E

DISCUSSION

Trend Study No. 16C-37 (31-35)

The Joe's Valley Overlook is a new site established in 1994 which monitors a mixed mountain brush community on a ridge east of Joe's valley reservoir and above Cottonwood creek. The area is administered by the Forest Service. The site has a slope of about 13% with a west-southwest aspect. Elevation is approximately 8,950 feet. The area has been contour trenched in the past and seeded. The area has been closed to cattle grazing since the contour treatment, but some trespass is occurring. Deer and elk use this site during the spring and summer. Pellet group data from 1999 estimate 9 deer, 83 elk and 20 cow days use/acre (22 ddu/ha, 205 edu/ha, 49 cdu/ha). Most of the cattle pats are from last season but there are cows currently grazing in the area. Most of the elk and deer pellet groups appear to be several months old.

Soil on the site is moderate deep with an effective rooting depth estimated at just over 16 inches. Texture is a clay with a slightly alkaline pH (7.4). Phosphorus is limited at only 5.5 ppm. Values less than 10 ppm have been shown to limit normal plant growth and development. Rock and pavement are not abundant on the surface or in the profile. Percent bare ground is relatively high, currently ('99) at 32%. There is some erosion occurring but it is limited to the areas between contoured terraces.

A variety of browse species occur on the site including serviceberry, mountain big sagebrush, low rabbitbrush, and snowberry. This site was chosen in part, to monitor a sparse and perceived declining population of mountain mahogany. This is a marginal site for mountain mahogany because it is above its normal elevation range. A few scattered individuals in the 4 to 6 foot range grow in the area, but none were hit in the nested frequency belts or in the shrub density strips. The key browse species on the site consist of a moderately dense stand of mountain big sagebrush. This mostly mature population currently ('99) has adequate numbers of seedlings and young, a low decadency rate, and moderate to heavy utilization. Snowberry is also abundant. The mostly mature population was moderately utilized in 1994 but only lightly used in 1999. A small population of three foot tall moderate to heavily hedged serviceberry also grow on the site.

Due to the elevation and heavy elk and cattle use, the herbaceous understory is considered the key element of this site. Grasses and forbs combined account for 52% of the vegetative cover. This site was apparently seeded in the past. Seeded grasses, crested wheatgrass, intermediate wheatgrass and smooth brome, occur on the site but the most abundant grass is Salina wildrye which provided 67% of the grass cover in 1994 and 44% in 1999. Smooth brome is the most common seeded species. It grows in thick patches along the contoured trenches. Use of the grasses is heavy in places, especially within the contoured trenches. Forbs are diverse and contain several desirable species, yet many of the common forbs are low growing species like mat penstemon. Alfalfa, a seeded forb, was found in small numbers during both readings.

1994 APPARENT TREND ASSESSMENT

Ground cover characteristics are adequate to protect the soil. Vegetation cover appears low for a mountain brush site, but herbaceous vegetation which is more effective at holding the soil in place, accounts for over half of that cover. The browse trend appears stable for all species due to adequate reproductive potentials, low decadency rates, and light to moderate utilization. The herbaceous composition is dominated by the less desirable Salina wildrye which makes up 67% of the grass cover. Continuous heavy grazing on the more preferred species will only increase the dominance of this grass.

1999 TREND ASSESSMENT

Trend for soil is stable. Relative percent cover of bare ground and litter have remained similar to 1994 estimates. There is some localized erosion occurring but the trenches on contour have minimized its effects.

Trend for browse is stable. Use of the key mountain big sagebrush is heavier but vigor remains normal, recruitment has improved, and percent decadence is relatively low at 25%. Snowberry displays lighter use. Density has declined yet cover has increased and strip frequency has remained similar to 1994 estimates. The change in density may be due to the difficulty in identifying individual plants of this rhizomatous shrub. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses and forbs increased. Composition also improved since 1994. Nested frequency of the less desirable Salina wildrye declined significantly while frequency of crested wheatgrass, smooth brome, and pinewoods needlegrass increased significantly. Forbs are diverse with a few desirable species represented, but many of the common forbs are low in value and low growing.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 37

Type	Species	Nested Frequency '94	Nested Frequency '99	Quadrat Frequency '94	Quadrat Frequency '99	Average Cover % '94	Average Cover % '99
G	Agropyron cristatum	31	*59	11	20	.46	.81
G	Agropyron intermedium	5	11	4	4	.02	.04
G	Agropyron spicatum	16	22	7	8	.40	.31
G	Bromus inermis	49	*83	18	24	.93	2.54
G	Carex spp.	9	7	3	3	.21	.33
G	Elymus cinereus	6	5	2	1	.15	.15
G	Elymus salina	239	*185	71	56	8.26	5.36
G	Poa fendleriana	114	96	42	33	1.50	1.75
G	Poa secunda	5	-	3	-	.04	-
G	Stipa pinetorum	24	*58	10	21	.34	.86
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		498	526	171	170	12.35	12.18
Total for Grasses		498	526	171	170	12.35	12.18
F	Androsace septentrionalis (a)	-	38	-	18	-	.11
F	Arenaria fendleri	24	31	11	14	.15	.44
F	Astragalus convallarius	3	-	1	-	.00	-
F	Astragalus miser	10	11	4	4	.31	.33
F	Astragalus tenellus	8	6	3	2	.04	.15
F	Astragalus spp.	-	3	-	1	-	.15
F	Chaenactis douglasii	-	*7	-	3	-	.04
F	Erigeron eatonii	2	3	1	3	.00	.01
F	Eriogonum umbellatum	12	17	5	6	.12	.25
F	Hymenoxys richardsonii	33	41	14	18	.58	.78

Type	Species	Nested Frequency '94	'99	Quadrat Frequency '94	'99	Average Cover % '94	'99
F	Lesquerella spp.	-	4	-	2	-	.03
F	Lomatium spp.	-	4	-	2	-	.01
F	Lupinus argenteus	8	5	2	1	.15	.15
F	Medicago sativa	13	7	5	3	.02	.18
F	Penstemon caespitosus	41	*79	16	33	.52	2.25
F	Penstemon spp.	3	-	1	-	.03	-
F	Phlox austromontana	48	41	18	15	.51	.27
F	Potentilla spp.	3	*11	1	8	.00	.11
F	Schoencrambe linifolia	-	2	-	1	-	.00
F	Senecio multilobatus	-	2	-	1	-	.00
F	Unknown forb-annual (a)	1	-	1	-	.03	-
F	Unknown forb-perennial	7	*-	4	-	.04	-
Total for Annual Forbs		1	38	1	18	0.03	0.11
Total for Perennial Forbs		215	274	86	117	2.51	5.20
Total for Forbs		216	312	87	135	2.54	5.32

* Indicates significant difference at % = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 37

Type	Species	Strip Frequency '94	'99	Average Cover % '94	'99
B	Amelanchier utahensis	11	8	.56	.67
B	Artemisia nova	0	2	-	.38
B	Artemisia tridentata vaseyana	65	69	8.76	8.75
B	Chrysothamnus depressus	20	14	.07	.39
B	Chrysothamnus viscidiflorus	26	33	.43	.29
B	Gutierrezia sarothrae	0	1	-	.01
B	Pinus flexilis	-	-	-	.38
B	Symphoricarpos oreophilus	51	50	3.55	5.61
B	Tetradymia canescens	2	3	.03	.15
Total for Browse		175	180	13.42	16.64

CANOPY COVER --
Herd unit 16C, Study no: 37

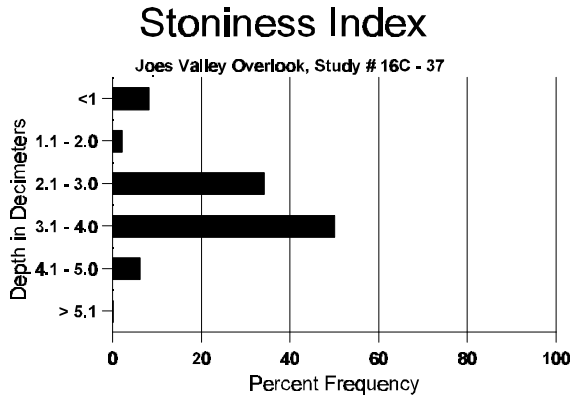
Species	Percent Cover '99
Pinus flexilis	3

BASIC COVER --
Herd unit 16C, Study no: 37

Cover Type	Nested Frequency '94	'99	Average Cover % '94	'99
Vegetation	371	413	28.10	35.87
Rock	286	78	4.41	1.75
Pavement	190	266	.48	7.40
Litter	480	438	31.17	35.45
Cryptogams	-	1	0	.00
Bare Ground	361	346	25.37	32.34

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 37, Study Name: Joes Valley Overlook

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.2	51.2 (17.3)	7.4	26.0	29.4	44.6	2.8	5.5	108.8	0.6



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 37

Type	Quadrat Frequency '94	'99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	25	14	n/a
Elk	40	40	83 (205)
Deer	19	7	9 (22)
Cattle	1	3	20 (49)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 37

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
Y	94	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	94	3	5	3	1	-	-	-	-	-	12	-	-	-	240	31	39	12
	99	-	6	-	-	1	2	-	-	-	9	-	-	-	180	30	35	9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	36%	21%	00%	-36%
'99	78%	22%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	280	Dec:		-
'99	180			-

Artemisia nova																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	1	-	-	-	-	-	-	-	2	-	-	-	40	7	15	2
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	0	Dec:		-
'99	40			-

Artemisia tridentata vaseyana																		
S	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
Y	94	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	99	15	6	2	-	-	-	-	-	-	23	-	-	-	460			23
M	94	67	26	-	-	-	-	1	-	-	94	-	-	-	1880	17	32	94
	99	24	33	24	2	4	1	-	-	-	88	-	-	-	1760	17	29	88
D	94	12	11	-	2	-	-	-	-	-	21	-	-	4	500			25
	99	12	12	9	1	3	-	-	-	-	28	1	-	8	740			37
X	94	-	-	-	-	-	-	-	-	-	-	-	-	-	780			39
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	620			31

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	30%	00%	03%	+17%
'99	39%	24%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	2460	Dec:		20%
'99	2960			25%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus depressus																		
Y	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	94	34	-	-	1	-	-	1	-	-	36	-	-	-	720	4	8	36
	99	9	7	4	1	-	2	-	-	-	22	1	-	-	460	2	7	23
D	94	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	2	-	-	-	2	-	-	-	2	-	-	2	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	03%	00%	00%	-30%
'99	32%	29%	07%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'94	800	Dec:		5%
	'99	560			14%

Chrysothamnus viscidiflorus																		
Y	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	94	44	5	4	5	-	-	1	-	-	58	-	-	1	1180	6	10	59
	99	41	12	1	-	-	2	-	-	-	56	-	-	-	1120	7	10	56
D	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	5	-	-	-	-	-	-	-	-	3	-	-	2	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	08%	06%	02%	+ 5%
'99	18%	05%	03%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'94	1240	Dec:		3%
	'99	1300			8%

Gutierrezia sarothrae																		
M	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'94	0	Dec:		-
	'99	40			-

Symphoricarpos oreophilus																		
S	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	11	-	-	-	-	-	-	-	-	10	-	1	-	220			11
M	94	78	56	5	6	8	-	-	-	-	153	-	-	-	3060	13	25	153
	99	94	5	-	5	-	-	-	-	-	98	4	2	-	2080	13	28	104
D	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	41%	03%	00%	-26%
'99	04%	00%	03%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'94	3120	Dec:		1%
	'99	2300			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
Y	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9	7	1
	99	1	1	-	-	-	-	-	-	-	2	-	-	-	40	4	7	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'94	00%	00%	00%	+33%
'99	33%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'94	40	Dec:		-
'99	60			-

Trend Study 16C-40-99

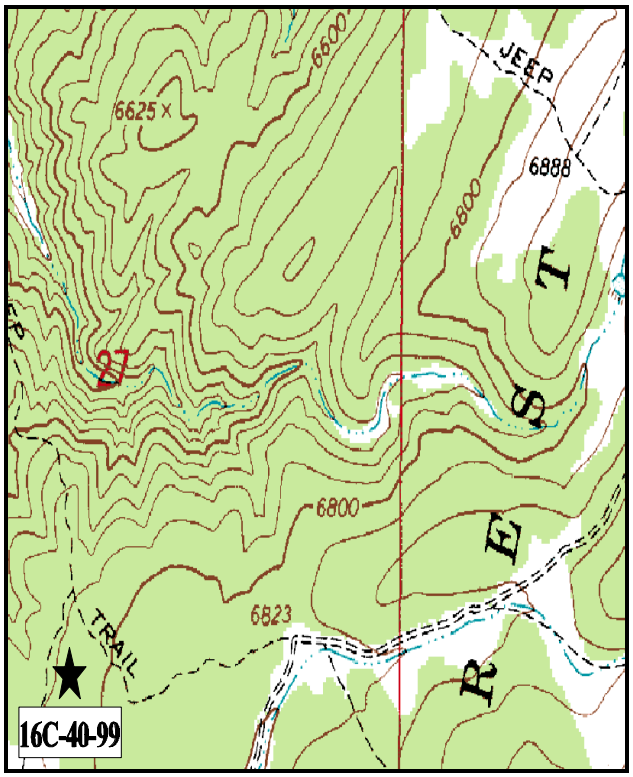
Study site name: Cedar Mountain . Range type: Chained, Cabled, Seeded, PJ .

Compass bearing: frequency baseline 180°M.

Footmark (first frame at) 5 feet, Frequency belt placement; line 1 (11 & 95), line 2 (34ft), line 3 (59ft), line 4 (71ft).

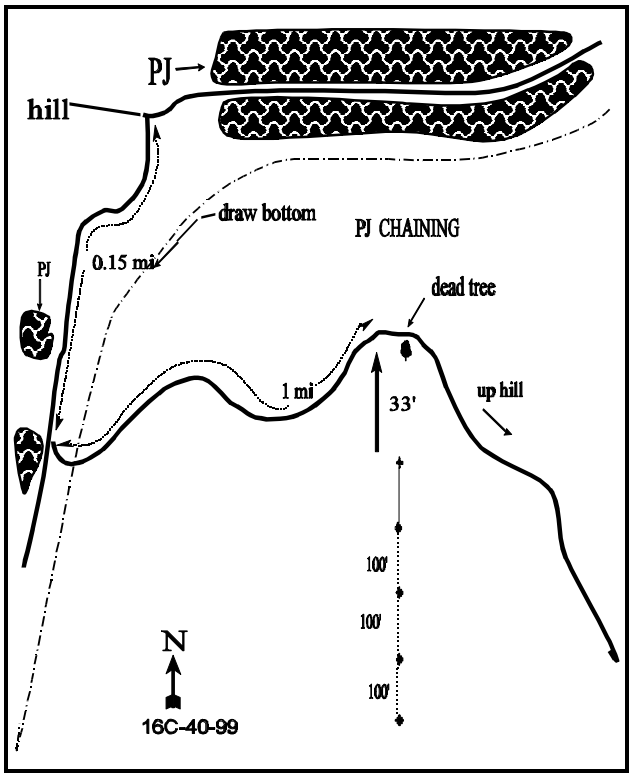
LOCATION DESCRIPTION

From mile marker 198 on U-89 north of Salina, take the Willow Creek Road east for 4.7 miles to a fork near a reservoir. Turn right and go south along the dike. Continue on this road for 5.65 miles up switchbacks to the top of the hill and southwest along the top until the road forks. Take the right fork through some oak and juniper and across a chained area, staying on the main road for 3.6 miles until coming to a fork. Turn left and proceed down the bottom of the draw 0.15 miles southwest to another fork. Turn left and go uphill 0.1 miles to the second bend to the right. The frequency baseline starts 33 feet south of the road beyond a large dead tree. The transect is marked by rebar approximately 2 feet tall. The 0-foot baseline stake has a red browse tag number 7039 attached.



Map Name: Salina, Utah

Township 21S , Range 1E , Section 27



Diagrammatic Sketch

UTM 4310984.067 N, 432579.154 E

DISCUSSION

Trend Study No. 16C-40 (43-6)

The Cedar Mountain study is located on a high plateau east of Salina. Elevation is 6,800 feet with a west aspect and 15% slope. The area was chained in 1979-80 and seeded with a mixture of grasses, forbs, and browse species. These juniper-pinyon slopes were heavily grazed by domestic sheep in the past. Since the chaining, there has been no grazing and the grasses have responded with good forage production. The current management plan is for sheep grazing every third year from May 1 to June 1. Year-round deer use has been insignificant. Pellet group data from 1999 estimate only 10 deer and 34 elk days use/acre (25 ddu/ha, 84 edu/ha). Rabbit pellets are common. Most of the elk pellet groups were from earlier this spring ('99). Good hiding and thermal cover exists in the unchained draw bottoms and islands of pinyon-juniper trees.

The soil is productive and relatively deep. Effective rooting depth is estimated at just over 14 inches. Soil texture is a clay loam with a slightly alkaline pH (7.6). Percent organic matter is relatively high at 5.4%, but phosphorus is limited at only 5.1 ppm. Values for phosphorus less than 10 ppm have been shown to limit normal plant growth and development. Erosion is minimal due to a vigorous stand of sod-forming perennial grasses. Litter is also common and well distributed.

There are few browse species present. Mature juniper and pinyon, averaging 8 to 12 feet in height, dominate the site by providing basically all of the browse cover. They are vigorous, producing seeds, and not utilized. Point quarter data from 1999 estimate 44 pinyon and 90 juniper trees/acre. Average diameter of pinyon is 3.7 inches, while that of juniper is 4.8 inches. About 15% of the juniper trees sampled were tipped-over trees that are still living. There are a few black sagebrush, rabbitbrush, and Gambel oak on the site which all display light use. Nearby, some mature mountain big sagebrush and mountain mahogany also have survived the chaining. These plants are also vigorous and only lightly browsed. Big sagebrush, bitterbrush, and fourwing saltbush were supposedly seeded, but no established plants were observed.

Grasses dominant the site by providing 71% of the total vegetative cover. Intermediate wheatgrass is the most abundant and it produces 61% of the grass cover. Other abundant grasses are smooth brome and crested wheatgrass. There are a few other grass species present, although they occur in very small numbers. Forbs are scarce. Alfalfa and small burnet were not found on the transect in 1985 or 1991, but a few were observed nearby indicating spotty establishment of forbs. Some alfalfa was encountered in 1999.

1985 APPARENT TREND ASSESSMENT

The soil has stabilized and trend appears upward for herbaceous species since the chaining. The seeding was successful in establishing a vigorous stand of grasses. Big game use could be enhanced by interseeding more browse and forb species.

1991 TREND ASSESSMENT

The data indicates a continued upward trend for the herbaceous species. Respectively, intermediate wheatgrass, crested wheatgrass, and smooth brome have the following quadrat frequency values; 91%, 51%, and 52%. Shrubs are still in very low numbers, but will increase in time. The soil trend is stable.

TREND ASSESSMENT
soil - stable
browse - up, but still in very low numbers, will improve with time
herbaceous understory - up, due mostly to seeded grasses

1999 TREND ASSESSMENT

Trend for soil is considered stable. Percent cover of bare ground has declined from 18% to 10%, however litter cover has also declined. Overall, erosion is minimal. Trend for browse is stable but useful shrubs are nearly absent on the site. The only common browse are released pinyon and juniper trees which are currently about 8 to 10 foot tall. There are only a few black sagebrush and Gambel oak sampled on the site. Shrubs will never be abundant on the site unless they are seeded or planted. Pinyon and juniper trees will continue to increase in size and density until they regain dominance. The abundant herbaceous understory will slow this transition, but the only thing that will reverse it is a burn or some other treatment to control the trees. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses is down slightly. The most abundant species, crested and intermediate wheatgrass, and smooth brome, have remained at similar levels compared to 1991. Forbs are lacking and have declined in sum of nested frequency. Some seeded alfalfa was encountered. The more abundant species are annuals or low value, low growing species.

TREND ASSESSMENT
soil - stable
browse - stable but severely lacking
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 40

Type	Species	Nested Frequency '85	'91	'99	Quadrat Frequency '85	'91	'99	Average Cover % '99
G	Agropyron cristatum	111	116	144	49	51	56	3.20
G	Agropyron intermedium	248	274	235	82	91	82	7.69
G	Agropyron spicatum	a-	c34	b8	-	15	3	.21
G	Bromus inermis	a113	ab137	b161	46	52	59	1.31
G	Elymus junceus	-	1	2	-	1	1	.03
G	Elymus salina	3	-	-	1	-	-	-
G	Festuca ovina	4	-	-	2	-	-	-
G	Hordeum jubatum jubatum	b6	a-	a-	3	-	-	-
G	Koeleria cristata	b7	a-	a-	3	-	-	.00
G	Oryzopsis hymenoides	b6	ab6	a-	4	2	-	-
G	Poa fendleriana	-	2	7	-	1	3	.02
G	Poa secunda	-	1	6	-	1	2	.02
G	Sitanion hystrix	a-	b22	a1	-	10	1	.00
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		498	593	564	190	224	207	12.51
Total for Grasses		498	593	564	190	224	207	12.51
F	Alyssum alyssoides (a)	-	-	49	-	-	19	.09
F	Arabis spp.	5	2	-	2	1	-	-
F	Astragalus marianus	3	5	-	2	4	-	-
F	Castilleja chromosa	a-	b9	a-	-	5	-	-

Type	Species	Nested Frequency '85	'91	'99	Quadrat Frequency '85	'91	'99	Average Cover % '99
F	Carduus nutans (a)	1	2	-	1	2	-	-
F	Calochortus nuttallii	$_{a}$-	$_{b}$9	$_{a}$-	-	4	-	-
F	Chaenactis douglasii	$_{a}$-	$_{b}$13	$_{ab}$1	-	8	1	.00
F	Crepis acuminata	-	1	-	-	1	-	-
F	Cryptantha spp.	$_{a}$7	$_{b}$30	$_{a}$9	3	15	4	.04
F	Cynoglossum officinale	-	3	3	-	1	1	.03
F	Erigeron spp.	-	3	-	-	1	-	-
F	Eriogonum umbellatum	$_{b}$11	$_{a}$-	$_{b}$6	4	-	3	.01
F	Gilia spp. (a)	$_{a}$1	$_{b}$30	$_{a}$3	1	19	2	.01
F	Lomatium spp.	-	2	-	-	2	-	-
F	Medicago sativa	-	-	7	-	-	2	.53
F	Penstemon pachyphyllus	$_{ab}$3	$_{b}$9	$_{a}$-	1	5	-	-
F	Physaria acutifolia	$_{a}$-	$_{b}$36	$_{b}$12	-	15	7	.06
F	Phlox austromontana	19	23	11	8	13	6	.05
F	Senecio multilobatus	$_{a}$-	$_{b}$12	$_{a}$-	-	5	-	-
F	Taraxacum officinale	-	4	-	-	2	-	-
F	Tragopogon dubius	4	-	3	2	-	3	.01
F	Unknown forb-perennial	-	3	-	-	1	-	-
Total for Annual Forbs		2	32	52	2	21	21	0.10
Total for Perennial Forbs		52	164	52	22	83	27	0.75
Total for Forbs		54	196	104	24	104	48	0.86

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 40

Type	Species	Strip Frequency '99	Average Cover % '99
B	Artemisia nova	1	-
B	Artemisia tridentata vaseyana	0	-
B	Chrysothamnus depressus	-	-
B	Chrysothamnus viscidiflorus	0	-
B	Juniperus osteosperma	11	2.36
B	Pinus edulis	2	1.87
B	Quercus gambelii	1	-
Total for Browse		15	4.24

CANOPY COVER --
Herd unit 16C, Study no: 40

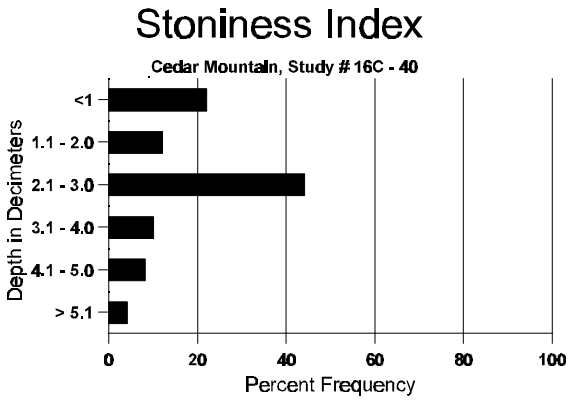
Species	Percent Cover ⍰99
Juniperus osteosperma	1

BASIC COVER --
Herd unit 16C, Study no: 40

Cover Type	Nested Frequency ⍰99	Average Cover % '85	'91	'99
Vegetation	326	7.25	7.25	22.26
Rock	165	5.50	6.75	6.38
Pavement	216	9.25	6.75	6.41
Litter	373	63.25	61.00	49.76
Cryptogams	14	.25	0	.19
Bare Ground	191	14.50	18.25	9.80

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 40, Study Name: Cedar Mountain

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.2	55.0 (15.1)	n/a	31.3	32.2	36.6	5.4	5.1	217.6	0.7



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 40

Type	Quadrat Frequency ⍰99	Pellet Transect Days Use/Acre (ha) ⍰99
Rabbit	27	n/a
Elk	15	34 (84)
Deer	18	10 (25)
Cattle	1	0

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 40

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	6	14	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'91	0		-
	'99	60		-

Artemisia tridentata vaseyana																		
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'91	0		-
	'99	0		-

Chrysothamnus viscidiflorus																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	9	11	1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'91	66		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	99	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66	47	43	1
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66	69	67	1
	99	9	-	-	-	-	-	-	1	-	10	-	-	-	200	-	-	10
D	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	+ 0%
'91	00%	00%	00%	+56%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	132	Dec:	50%
	'91	132		0%
	'99	300		0%

Pinus edulis																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	-39%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'91	66		-
	'99	40		-

Quercus gambelii																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'91	0		-
	'99	40		-

Trend Study 16C-41-99

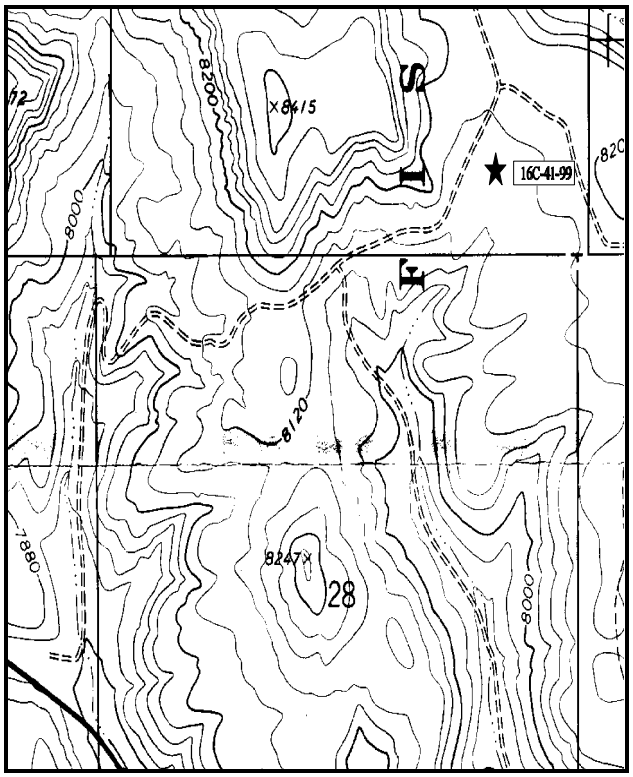
Study site name: Trough Hollow . Range type: Mixed Mountain Brush .

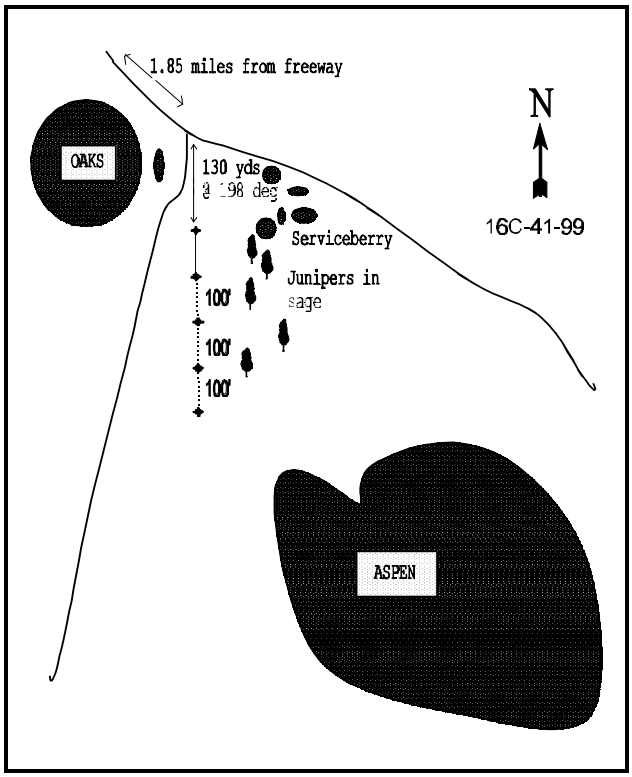
Compass bearing: frequency baseline 180°M.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Salina drive about 37.5 miles east on I-70 to a rest area exit. From the exit turn right and come back west on the frontage road paralleling the freeway for 4.1 miles to an intersection. Turn right on F.S. Road #011 and drive 0.25 miles to cross under the freeway. From the tunnel proceed 1.85 miles up and around a hill, then on to a major intersection. Stop here and look back at a bearing of 198 degrees to the largest juniper close to the road. It is about 130 yards from the intersection. Go back to this juniper to find the 0-foot baseline stake, 10 feet south of the tree out in the sagebrush flat. The stake is marked with browse tag #7192.





Map Name: Old Woman Plateau, Utah Diagrammatic Sketch

Township 23S , Range 4E , Section 21 UTM 4293330.843 N, 459813.400 E

DISCUSSION

Trend Study No. 16C-41 (45-1)

This trend study, Trough Hollow, is found on the south end of the Old Woman Plateau at an elevation of 8,200 feet. The site is on a slight slope with a southern exposure. It samples an open area dominated by mountain big sagebrush. The range type is described as mixed mountain brush because of the great variety of desirable browse species. The area provides good year long habitat for deer, especially in spring and fall. Deer were seen near the study site in July of 1985, and fresh tracks crossed the transect. Pellet group data from 1999 estimate 31 deer, 53 elk and 38 cow days use/acre. Most of the deer and elk pellet groups appeared to be several months old, but about 20% of the elk pellet groups were from this spring. The area is quite popular for deer hunting and access is good on this part of the plateau. Grazing pressure is moderate and a deferred grazing system is used on the allotment. It is grazed June through October.

The soil is moderately deep and appears well developed. Effective rooting depth is estimated at almost 17 inches. Soil texture is a sandy clay loam with a neutral pH (6.9). There is very little rock in the soil profile or on the surface. Stoniness measurements are more a reflection of soil compaction since no rock was hit. A compacted clay horizon was encountered at a depth of about 10 to 12 inches. This does not appear to be a rooting barrier however. The ground is covered with a high percent of litter and vegetation with little bare soil exposed.

Mountain big sagebrush and bitterbrush are the key browse species on the site. Mountain big sagebrush currently (‘99) provides 59% of the browse cover, while bitterbrush accounts for 31%. The sagebrush population appears stable with good recruitment, light use, and good vigor. Percent decadence was high in 1985 at 45%, but it has steadily declined to only 19% in 1999. Bitterbrush has shown consistent moderate to heavy use since 1985. Most of the population was classified as decadent in 1991, now these plants have since regained their health. Use is currently (‘99) mostly heavy but vigor is good and only 1% of the population is considered decadent. These plants display a spreading prostrate growth form, forming a secondary cover under the sagebrush.

Additional browse forage is provided by small numbers of serviceberry, rabbitbrush, woods rose, snowberry, and gray horsebrush. Serviceberry has a stable population of about 600 plants/acre. They show moderate to heavy use and normal vigor. There are scattered clones of oak in the area, but they do not appear to be spreading.

There are many species of perennial grasses growing under and between the sagebrush, creating a fairly dense ground cover. The grasses were all vigorous with use appearing to be light to moderate when the study was established. The most common grasses are mutton and Kentucky bluegrass, letterman needlegrass, and western and slender wheatgrass. Use of the grasses growing in the open was moderate to heavy in 1999. Forbs are diverse and fairly abundant. Some provide highly palatable and preferred forage for deer, such as redroot eriogonum, penstemon, fleabanes, legumes, and dandelion. Utilization of forbs is generally light.

1985 APPARENT TREND ASSESSMENT

The soil is stable and improving as litter and dense vegetation give protection, add to the organic matter, and help build up the soil. The vegetative community appears stable at present. The great species diversity, and general health and vigor of the desirable species, contributes to the stability of the community. However, the current rate of sagebrush reproduction may be inadequate to maintain the population in the future. Continued light to moderate use by both big game and livestock also tends to promote stability.

1991 TREND ASSESSMENT

Soil appears basically unchanged and stable, which could probably be considered an improvement with the extended length of the drought. There has been a decrease in litter, but with a corresponding increase in vegetative cover. Trend for the key browse species: service berry, mountain big sagebrush, and rabbitbrush are essentially stable with the exception of a slight decrease for bitterbrush. The principal species, mountain big sagebrush, has a slight decreased in it's population (3%), but decadency has gone from 45% down to 22%. This slight decrease in density would be expected from the extended drought. About half of the grasses sampled have increased nested and quadrat frequencies, especially western wheatgrass. Nested frequency of perennial forbs have increased slightly.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

1999 TREND ASSESSMENT

Trend for soil continues to be stable. Ground cover characteristics have remained similar to 1991 levels. Trend for the key species, mountain big sagebrush and bitterbrush, is up slightly. Density of sagebrush is up slightly, use is lighter, and percent decadency has declined from 22% to 19%. Recruitment remains good with 21% of the population consisting of young plants. Bitterbrush has also increased slightly in density. Use is heavier but vigor improved and percent decadence has declined from 62% to only 1%. Some of the differences in density of sagebrush and bitterbrush may be due to the much larger sample used in 1999. Trend for the herbaceous understory is down slightly for grasses and down for forbs. Sum of nested frequency for perennial grasses and forbs has declined. Sum of nested frequency of western wheatgrass and mutton bluegrass have declined significantly while frequency of Kentucky bluegrass has increased significantly. Nested frequency of forbs has declined dramatically.

TREND ASSESSMENT
soil - stable
browse - up slightly
herbaceous understory - down slightly

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 41

Type	Species	Nested Frequency '85	'91	'99	Quadrat Frequency '85	'91	'99	Average Cover % '99
G	Agropyron smithii	a99	b215	a91	35	74	36	1.06
G	Agropyron trachycaulum	a-	b34	b25	-	13	8	.92
G	Bouteloua gracilis	b12	b14	a-	4	5	-	-
G	Bromus ciliatus	b16	a-	c66	7	-	29	.71
G	Bromus inermis	ab5	a-	b8	2	-	4	.04
G	Carex spp.	5	12	14	3	4	5	.24
G	Festuca ovina	b13	a-	a-	6	-	-	-
G	Poa fendleriana	b227	b214	a175	80	76	60	7.59
G	Poa pratensis	a13	b116	c166	5	44	57	6.27

Type	Species	Nested Frequency '85	'91	'99	Quadrat Frequency '85	'91	'99	Average Cover % '99
G	Poa secunda	-	4	-	-	2	-	-
G	Sitanion hystrix	$_{b}$162	$_{a}$38	$_{a}$13	53	19	6	.20
G	Stipa columbiana	2	3	6	1	1	2	.18
G	Stipa lettermani	119	105	95	41	41	37	2.16
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		673	755	659	237	279	244	19.41
Total for Grasses		673	755	659	237	279	244	19.41
F	Agoseris glauca	$_{a}$-	$_{b}$76	$_{a}$-	-	33	-	-
F	Antennaria rosea	$_{a}$14	$_{b}$29	$_{a}$12	4	15	6	.62
F	Androsace septentrionalis (a)	-	-	64	-	-	27	.41
F	Arabis spp.	$_{a}$-	$_{ab}$4	$_{b}$13	-	2	5	.05
F	Astragalus convallarius	$_{b}$113	$_{a}$35	$_{a}$18	49	16	9	.16
F	Aster spp.	$_{b}$4	$_{a}$-	$_{a}$-	3	-	-	-
F	Astragalus spp.	4	8	12	2	4	5	.22
F	Castilleja chromosa	5	10	3	3	4	3	.06
F	Calochortus nuttallii	$_{b}$90	$_{c}$148	$_{a}$-	47	61	-	-
F	Chaenactis douglasii	-	-	2	-	-	1	.00
F	Cirsium wheeleri	3	4	2	3	4	1	.03
F	Collinsia parviflora (a)	-	-	3	-	-	2	.01
F	Crepis acuminata	$_{b}$12	$_{b}$6	$_{a}$-	5	3	-	-
F	Erigeron caespitosus	$_{b}$10	$_{a}$-	$_{a}$-	4	-	-	-
F	Erigeron eatonii	$_{b}$105	$_{b}$96	$_{a}$23	42	42	14	.31
F	Erigeron flagellaris	16	7	16	6	4	7	.13
F	Erigeron pumilus	$_{a}$5	$_{ab}$14	$_{b}$18	2	7	8	.50
F	Eriogonum racemosum	$_{ab}$112	$_{b}$122	$_{a}$88	54	54	39	1.36
F	Eriogonum umbellatum	9	6	19	5	5	9	.24
F	Gilia aggregata	5	-	-	2	-	-	-
F	Ipomopsis aggregata	-	-	1	-	-	1	.00
F	Lithospermum ruderale	-	3	-	-	2	-	-
F	Lupinus argenteus	8	2	8	3	1	4	.54
F	Lychnis drummondii	-	-	3	-	-	1	.00
F	Machaeranthera canescens	-	-	2	-	-	1	.03
F	Oxybaphus linearis	$_{b}$12	$_{a}$-	$_{a}$-	5	-	-	-
F	Penstemon palmeri	2	-	-	2	-	-	-
F	Penstemon pachyphyllus	5	11	1	2	4	1	.15
F	Petradoria pumila	-	-	2	-	-	1	.00
F	Penstemon watsonii	$_{a}$5	$_{b}$29	$_{b}$21	3	17	13	.31
F	Polygonum douglasii (a)	-	-	18	-	-	9	.04
F	Senecio multilobatus	-	-	1	-	-	1	.00

Type	Species	Nested Frequency '85	'91	'99	Quadrat Frequency '85	'91	'99	Average Cover % ⍁99
F	Taraxacum officinale	23	15	26	11	9	11	.08
F	Tragopogon dubius	-	3	-	-	1	-	-
F	Trifolium spp.	6	5	-	2	2	-	-
F	Unknown forb-perennial	$_{b}$34	$_{a}$-	$_{a}$-	13	-	-	-
F	Vicia americana	$_{b}$18	$_{b}$11	$_{a}$-	8	5	-	-
F	Zigadenus paniculatus	$_{b}$6	$_{b}$12	$_{a}$-	4	5	-	-
Total for Annual Forbs		0	0	85	0	0	38	0.46
Total for Perennial Forbs		626	656	291	284	300	141	4.86
Total for Forbs		626	656	376	284	300	179	5.32

Values with different subscript letters are significantly different at ⍂ = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16C, Study no: 41

Type	Species	Strip Frequency ⍁99	Average Cover % ⍁99
B	Amelanchier utahensis	25	.66
B	Artemisia tridentata vaseyana	96	19.40
B	Chrysothamnus viscidiflorus viscidiflorus	37	1.11
B	Juniperus osteosperma	1	.38
B	Juniperus scopulorum	1	-
B	Mahonia repens	13	.18
B	Purshia tridentata	71	10.40
B	Rosa woodsii	7	.49
B	Symphoricarpos oreophilus	11	.45
B	Tetradymia canescens	5	.06
Total for Browse		267	33.16

CANOPY COVER --
Herd unit 16C, Study no: 41

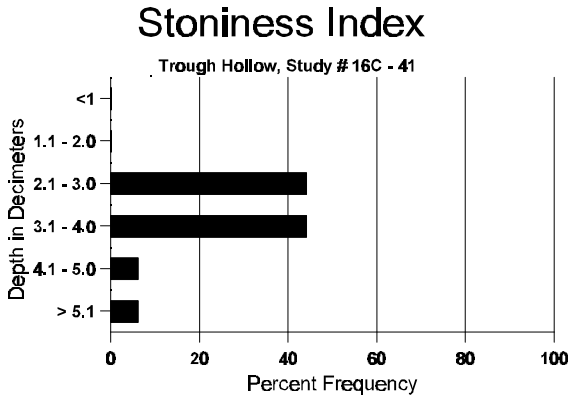
Species	Percent Cover ⍁99
Juniperus scopulorum	1

BASIC COVER --
Herd unit 16C, Study no: 41

Cover Type	Nested Frequency ⁞99	Average Cover % '85	'91	'99
Vegetation	368	13.25	21.25	56.79
Rock	-	0	.50	0
Pavement	25	0	.25	.21
Litter	377	73.00	63.25	59.30
Cryptogams	28	.75	.25	.21
Bare Ground	185	13.00	14.50	13.29

SOIL ANALYSIS DATA --
Herd Unit 16C, Study # 41, Study Name: Trough Hollow

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.9	46.0 (15.7)	n/a	48.0	25.4	26.6	2.3	8.5	163.2	0.6



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 41

Type	Quadrat Frequency ⁞99	Pellet Transect Days Use/Acre (ha) ⁞99
Rabbit	5	n/a
Elk	11	53 (131)
Deer	13	31 (77)
Cattle	7	38 (94)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 41

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	6	2	-	-	-	-	-	-	-	8	-	-	-	533			8
	91	3	2	-	-	-	-	1	-	-	6	-	-	-	400			6
	99	11	1	1	-	1	-	-	-	-	14	-	-	-	280			14
M	85	-	1	-	-	-	-	-	-	-	1	-	-	-	66	10	15	1
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	66	21	13	1
	99	-	4	4	-	2	5	1	-	-	14	1	1	-	320	20	18	16
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	1	-	-	-	-	-	-	1	2	-	-	-	133			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	33%	00%	00%	+ 0%
'91	33%	11%	00%	+ 0%
'99	27%	33%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	599	Dec:		0%
'91	599			22%
'99	600			0%

Artemisia tridentata vaseyana																		
S	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666			10
	91	1	-	-	1	-	-	-	-	-	2	-	-	-	133			2
	99	25	-	-	1	-	-	-	-	-	26	-	-	-	520			26
Y	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	91	12	-	-	-	-	-	-	-	-	12	-	-	-	800			12
	99	54	1	-	-	-	-	-	-	-	55	-	-	-	1100			55
M	85	19	11	-	-	-	-	-	-	-	26	-	4	-	2000	26	25	30
	91	25	3	-	8	1	-	-	-	-	31	4	2	-	2466	26	32	37
	99	153	3	3	-	-	-	-	-	-	159	-	-	-	3180	35	42	159
D	85	14	15	-	-	-	-	-	-	-	24	-	5	-	1933			29
	91	7	5	-	2	-	-	-	-	-	12	1	1	-	933			14
	99	41	6	-	2	-	-	-	-	-	41	-	-	8	980			49
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	540			27

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	40%	00%	14%	- 3%
'91	14%	00%	05%	+20%
'99	04%	01%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	4333	Dec:		45%
'91	4199			22%
'99	5260			19%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	91	14	5	-	3	-	-	5	-	-	24	3	-	-	1800			27
	99	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	85	18	-	-	-	-	-	-	-	-	18	-	-	-	1200	5	8	18
	91	3	2	-	2	-	-	-	-	-	6	-	-	1	466	4	9	7
	99	99	-	-	1	-	-	-	-	-	100	-	-	-	2000	8	11	100

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	+21%
'91	21%	00%	03%	- 6%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	1800	Dec:	-
	'91	2266		-
	'99	2120		-

Juniperus osteosperma																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'91	0		-
	'99	20		-

Juniperus scopulorum																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'91	0		-
	'99	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	4	-	-	1	-	-	-	-	-	5	-	-	-	333			5
	99	24	-	-	2	-	-	-	-	-	26	-	-	-	520			26
M	85	21	-	-	-	-	-	-	-	-	21	-	-	-	1400	3	3	21
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	78	-	-	-	-	-	-	-	-	78	-	-	-	1560	2	4	78

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	-80%
'91	00%	00%	00%	+84%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	1666	Dec:	-
	'91	333		-
	'99	2080		-

Purshia tridentata																		
S	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	85	5	1	-	-	-	-	-	-	-	6	-	-	-	400			6
	91	1	3	-	-	1	-	1	-	-	6	-	-	-	400			6
	99	17	2	9	3	-	2	-	-	-	33	-	-	-	660			33
M	85	5	12	5	-	-	-	-	-	-	22	-	-	-	1466	19	28	22
	91	1	1	1	-	1	-	-	-	-	4	-	-	-	266	9	19	4
	99	4	8	53	-	9	25	-	-	-	99	-	-	-	1980	21	38	99
D	85	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	91	1	-	1	1	-	1	7	2	3	10	-	-	6	1066			16
	99	-	-	2	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	45%	21%	00%	-10%
'91	23%	23%	23%	+35%
'99	14%	68%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	1932	Dec:	3%
	'91	1732		62%
	'99	2680		1%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	10	-	-	7	-	-	-	-	-	17	-	-	-	340	11	8	17

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'91	0		-
	'99	620		-

Symphoricarpos oreophilus																		
S	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	85	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	91	4	2	-	-	-	-	-	-	-	6	-	-	-	400			6
	99	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200	9	10	3
	91	1	-	-	2	2	-	2	-	-	7	-	-	-	466	9	14	7
	99	14	1	-	-	-	-	-	-	-	15	-	-	-	300	18	22	15
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	1	-	-	-	-	1	-	-	-	66			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	+21%
'91	36%	00%	00%	-38%
'99	03%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	733	Dec:	0%
	'91	932		7%
	'99	580		0%

Tetradymia canescens																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	4	-	-	1	-	-	-	-	-	5	-	-	-	100	8	7	5
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'91	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	0%
	'91	0		0%
	'99	120		17%

SUMMARY

WILDLIFE MANAGEMENT UNIT - 16C (31) - MANTI - NEBO, MANTI SOUTH

The 26 trend studies on unit 16C are difficult to group and categorize due to the extensive diversity. Eight sites sample pinyon-juniper chainings, seven sites sampled mountain big sagebrush, six sites sample mixed mountain brush, two sites sampled black sagebrush, two sites sampled curlleaf mountain mahogany, and one site sampled Wyoming big sagebrush. All sites sample deer or elk winter range except Joe's Valley overlook #37 and Trough Hollow #41.

Pinyon-juniper chainings make up a large portion of the studies that sample winter range for big game on this unit. These transects include Red Point (#14), Howard Forest Service Chaining (#15), Middle Mountain (#17), Dry Mountain (#26), Birch Creek Chaining (#27), South of Dry Wash (#28), Danish Bench (#36) and Cedar Mountain (#40). Soil trend on these chaining study sites are all stable or slightly improved. Browse trends are stable at Red Point, Howard Forest Service Chaining, Birch Creek Chaining, Danish Bench, and Cedar Mountain, and slightly up for the other three sites. Herbaceous trends are stable or slightly up for all sites but in poor condition at Red Point, Howard Forest Service Chaining, South of Dry Wash, and Danish Bench.

Another important component of the winter ranges sampled on this unit are the mountain big sagebrush flats. These studies include East Mountain (#18), Miles Point (#20), North Horn-Rock Canyon (#22), Black Dragon (#23), South Horn 1/4 Corner (#25), Muddy Creek (#32), and Wildcat Knolls (#35). Soil trends on all of these sites are stable except for Muddy Creek which is up slightly. However, soil conditions are very poor on Muddy Creek and accelerated erosion is still occurring. Browse trends are stable at East Mountain, Miles Point, North Horn Rock Canyon, and Black Dragon. An upward browse trend is found at South Horn 1/4 corner and a slightly upward browse trend at Wildcat Knolls. The only downward browse trend occurs at Muddy Creek which has a slightly downward trend.

Six studies sample mixed mountain brush which are all at elevations above 8,300 feet. These studies include Trail Mountain Exclosure (#19), North Horn Cap (#21), South Horn Exclosure (#24), Upper Hole Trail (#30), Joe's Valley Overlook (#37), and Trough Hollow (#41). Soil trends are stable at Trail Mountain Exclosure, Joe's Valley Overlook, and Trough Hollow and up or slightly up on the other three sites. North Horn Cap displays an upward soil trend, although conditions are poor with abundant bare ground exposed on the steep slope. Erosion is still a problem between the contoured terraces. Browse trends are stable at Trail Mountain Exclosure, Upper Hole Trail, and Joe's Valley Overlook. Browse trends are slightly upward at South Horn Exclosure and Trough Hollow. North Horn Cap has displayed a slightly downward browse trend since 1994. Herbaceous trends are slightly improved at Trail Mountain Exclosure, North Horn Cap, and Joe's Valley Overlook. They are stable at South Horn Exclosure and Upper Hole Trail. Trough Hollow displays a slightly downward herbaceous trend.

Black sagebrush is sampled by the Box Canyon Knolls (#31) and South Sage Flat (#34) studies. South Sage Flat was established in 1994 to monitor elk use. This site shows stable soil, browse, and herbaceous trends. Box Canyon Knolls has a stable soil and browse trend but the herbaceous trend is slightly down.

Curlleaf mountain mahogany is sampled on two sites, West Huntington Canyon (#13) and Scab Hollow (#29). West Huntington Canyon has stable soil, browse, and herbaceous trends while Scab Hollow has a stable browse trend and a slightly upward soil and herbaceous trend.

Little Nelson Mountain samples an opening of Wyoming big sagebrush along Ferron Creek. This was a new study established in 1994. It displays an upward soil and herbaceous trend and a slightly upward browse trend.

TREND SUMMARY

Site	Category	1994	1999
16C-13 West Huntington Canyon	soil	0	0
	browse	-	0
	herbaceous understory	0	0
16C-14 Red Point	soil	+	0
	browse	0	0
	herbaceous understory	-	0
16C- 15 Howard Forest Service Chaining	soil	0	0
	browse	-	0
	herbaceous understory	-	+
16C-17 Middle Mountain	soil	-	+
	browse	0	+
	herbaceous understory	0	0
16C-18 East Mountain	soil	0	0
	browse	0	0
	herbaceous understory	-	0
16C-19 Trail Mountain Exclosure	soil	0	0
	browse	0	0
	herbaceous understory	-	+
16C-20 Miles Point	soil	0	0
	browse	0	0
	herbaceous understory	0	0
16C-21 North Horn Cap	soil	-	+
	browse	0	-
	herbaceous understory	0	+
16C-22 North Horn Rock Canyon	soil	-	0
	browse	-	0
	herbaceous understory	-	+
16C-23 Black Dragon	soil	0	0
	browse	0	0
	herbaceous understory	-	0

Site	Category	1994	1999
16C-24 South Horn Exclosure	soil	0	+
	browse	-	+
	herbaceous understory	-	0
16C-25 South Horn 1/4 Corner	soil	0	0
	browse	-	+
	herbaceous understory	-	0
16C-26 Dry Mountain	soil	-	0
	browse	0	+
	herbaceous understory	-	0
16C-27 Birch Creek Chaining	soil	0	+
	browse	0	0
	herbaceous understory	-	+
16C-28 South of Dry Wash	soil	0	+
	browse	0	+
	herbaceous understory	0	+
16C-29 Scab Hollow	soil	-	+
	browse	0	0
	herbaceous understory	-	+
16C-30 Upper Hole Trail	soil	+	+
	browse	0	0
	herbaceous understory	+	0
16C-31 Box Canyon Knolls	soil	+	0
	browse	+	0
	herbaceous understory	0	-
16C-32 Muddy Creek	soil	+	+
	browse	0	-
	herbaceous understory	+	0
16C-33 Little Nelson Mountain	soil	est	+
	browse	est	+
	herbaceous understory	est	+

Site	Category	1994	1999
16C-34 South Sage Flat	soil	est	0
	browse	est	0
	herbaceous understory	est	0
16C-35 Wildcat Knolls	soil	est	0
	browse	est	+
	herbaceous understory	est	-
16C-36 Danish Bench	soil	est	0
	browse	est	0
	herbaceous understory	est	0
16C-37 Joe's Valley Overlook	soil	est	0
	browse	est	0
	herbaceous understory	est	+
Site	Category	1991	1999
16C-40 Cedar Mountain	soil	0	0
	browse	+	0
	herbaceous understory	+	0
16C-41 Trough Hollow	soil	0	0
	browse	0	+
	herbaceous understory	0	-

(0) = stable, (+) = upward, (-) = downward, (0/-) = stable to slightly downward, (0/+) = stable to slightly upward